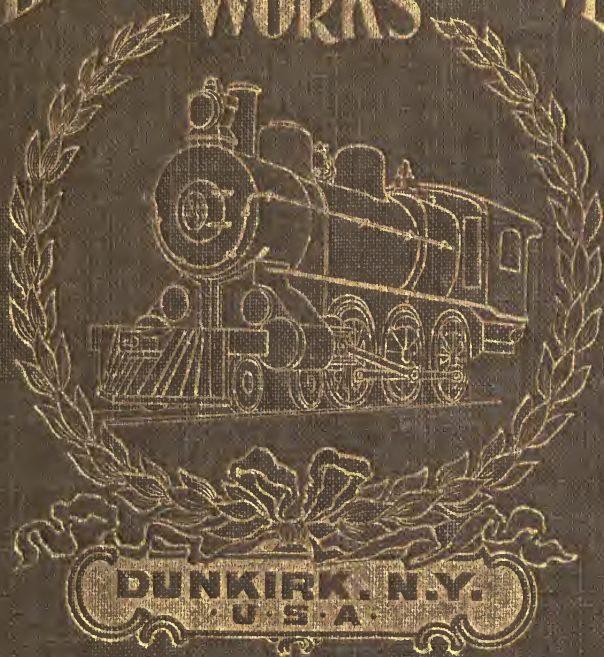


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BROOKS LOCOMOTIVE WORKS



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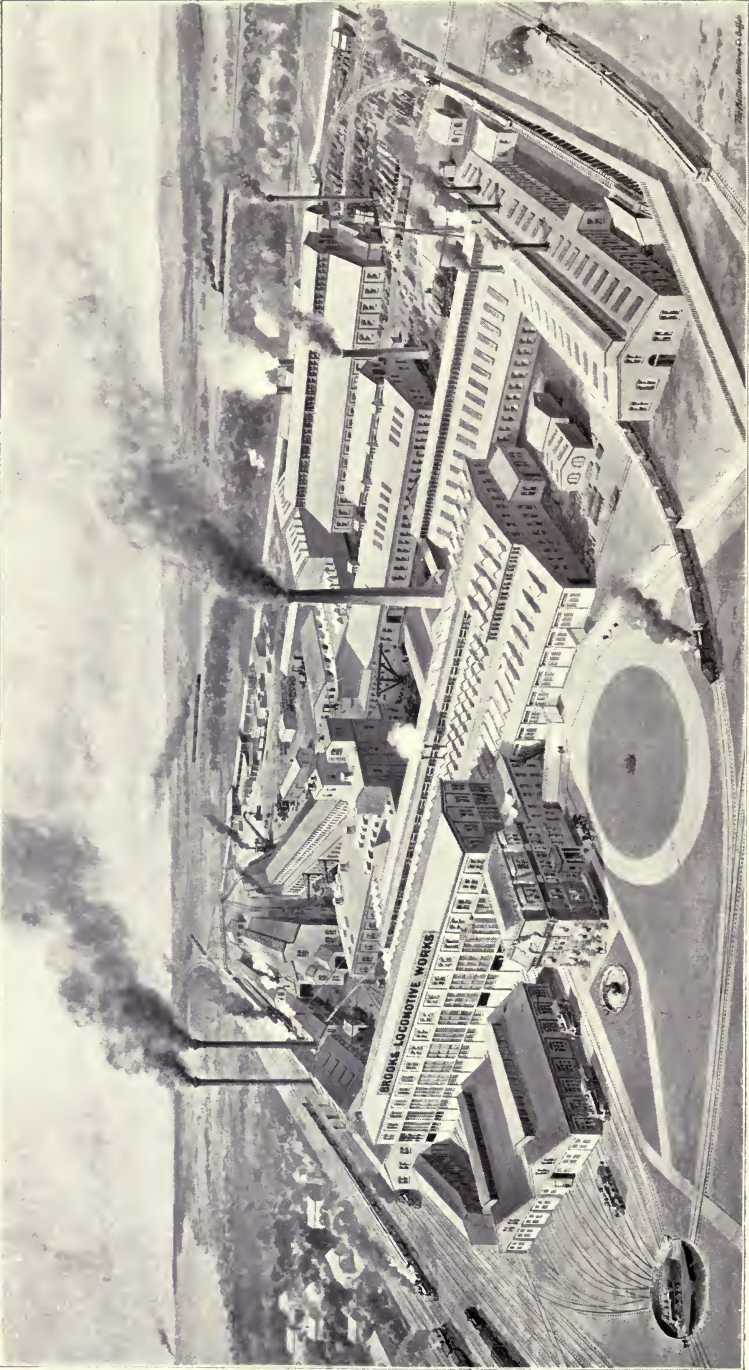
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BROOKS LOCOMOTIVE WORKS.

AMERICAN LOCOMOTIVE COMPANY

A CATALOGUE . . .

DESCRIPTIVE OF

SIMPLE AND COMPOUND

. . . **L**OCOMOTIVES

BUILT BY

BROOKS LOCOMOTIVE WORKS,

11

DUNKIRK, N. Y.,

U. S. A.

ANNUAL CAPACITY, 400.

OFFICERS:

FREDERICK H. STEVENS,
PRESIDENT.

ROBERT J. GROSS,
VICE-PRESIDENT.

M. L. HINMAN,
TREASURER.



T. M. HEQUEMBOURG,
SECRETARY.

D. RUSSELL,
GEN'L SUPERINTENDENT.

JAS. MCNAUGHTON,
SUPERINTENDENT.

1899.

CABLE ADDRESS, "BROOKS-DUNKIRK."

TJ 625
B7

TO THE
RAILWAY OFFICIALS OF ALL COUNTRIES,
BY WHOSE COMMANDING GENIUS
THE DESERT HAS BEEN MADE TO BLOOM AND
WHOSE LABORS HAVE TRANSFORMED THE EARTH
INTO ONE BROAD HIGHWAY OF COMMERCE ;
AND TO THE
MEN AT THE THROTTLE,
UPON WHOSE
COURAGE, FIDELITY AND INTELLIGENCE
DEPENDS THE SAFE AND SUCCESSFUL OPERATION
OF LOCOMOTIVES,
HOWEVER PERFECTLY CONSTRUCTED,
THIS BOOK
IS RESPECTFULLY DEDICATED.



INTRODUCTORY.

IN THE compilation of this new edition of our catalogue we have sought to bring together, in brief but comprehensive form, such illustrated and statistical information relating to the various types, construction and performance of "Brooks" locomotives as will render it deserving of the attention and consideration of all persons interested in the subject of motive power for railroads. It embodies much that is descriptive of the marked advance in locomotive construction and design which has obtained in the closing years of the century, and it aims to give such accurate data as will enable intending purchasers to arrive at an approximate understanding of their needs.

In the construction of our locomotives we employ only the highest grade of material and workmanship, and all the various details are accurately finished to standard gauges and templets, enabling us to guarantee their interchangeability on all locomotives of the same class.

We have special facilities for furnishing locomotive boilers, tanks and cylinders, and are prepared to furnish duplicate parts of any of our locomotives upon short notice.

Especial attention is invited to the "Brooks Improved Piston Valve," which is now in successful use on many of the engines of important trunk lines. The efficiency and economy which this form of valve has developed by reason of its simplicity and perfect balance bids fair to result in its superseding, to a great extent, the plain valve and the more complicated and expensive compound types. We submit it, with full confidence, to the thoughtful consideration of railway officials and engineers.

The increasing demand for heavier power has required the addition of adequate appliances and machinery for its construction. In this direction we have spared neither effort nor expense, and our shops are now equipped with the latest and most powerful machinery obtainable. Within the last two years there has been added to the

plant a commodious erecting shop, and the boiler and hammer shops have been reconstructed and greatly enlarged. A large percentage of the machinery in the works is operated by electric power, and the shops are amply equipped with powerful electric cranes, pneumatic hoists and tools, hydraulic flanging press, etc.

In thus enlarging our capacity for the manufacture of locomotives we have not lost sight of the increasing service required of them. While pursuing a conservative policy we have designed our engines along bold lines and in keeping with modern ideas and practice, and are fully prepared to submit proposals for locomotives of the most recent and approved types, suitable for any required service, and constructed either from our own designs and specifications or in accordance with those of railway companies.

We have ample facilities for supplying locomotives based upon foreign specifications if within the limits of American practice. This applies to both single expansion and compound types, and contemplates the use of copper fireboxes, brass tubes, screw couplings, etc., as desired.

All material and workmanship entering into the construction of our locomotives is rigidly inspected by competent engineers. The engines are, in all cases, fully erected and tested in running order on our own tracks, and, if for transport to a foreign country, are taken apart and securely packed for sea shipment.

We invite the correspondence of railway officials and of others who may contemplate the purchase of locomotives, and request that, in writing for proposals, full particulars be furnished as to gauge of road, maximum curvature, grades, weight of rail, fuel to be used and the kind of service required.

A cipher code will be found on the last pages of the catalogue for convenience in telegraphing.

Other codes used by us include "Atlantic," "Western Union," "A. B. C., Fourth Edition," "Lieber's," and "Manufacturers' Export."

BROOKS LOCOMOTIVE WORKS.

DUNKIRK, N. Y., December 1, 1899.

A BRIEF HISTORY AND DESCRIPTION
OF THE WORKS.



HORATIO G. BROOKS,
Founder of the Works.

A BRIEF HISTORY AND DESCRIPTION OF THE WORKS.

HORATIO G. BROOKS, founder of the BROOKS LOCOMOTIVE WORKS, was born on the 30th day of October, 1828, in the old historic city of Portsmouth, N. H. Sprung from that sturdy New England stock whose brain and brawn have left their deep impress upon the history of the century now closing, he, early in life, developed those marked traits which in later years made him a force in the affairs of his day and age. At 14 he passed his leisure hours on and about the engines of the Boston & Maine Railroad, and at 16, after much importunity, his parents yielded to his strong desire to learn the trade of a machinist, and placed him, as an apprentice, in the works of his cousins, Messrs. Isaac & Seth Adams, manufacturers of printing presses. Not finding this congenial, two years later he entered the shops of the Boston & Maine Railroad, at Andover, Mass. He became a close student of all that bore on the line of his work, and was tireless in acquiring all the knowledge then attainable concerning the construction and operation of locomotives. In order to extend his experience in this direction, he left the shops in 1848 and became a fireman on the Boston & Maine, and so valuable were the services he rendered in that capacity that a year later he was promoted to the position of engineer. Thus, at the early age of 21 he had made substantial progress along lines which later enabled him to put in successful play that organizing power which was the genius of his character. The course of railroading tended westward, and the young engineer, eager for pioneer work, enlisted his services with the New York & Erie Railroad, then extending its lines eastward from Dunkirk, its western terminus. The first duty assigned him was that of conveying from Boston, Mass., a locomotive for use on the new extreme western section of the road, and in November, 1850, by means of coaster, canal boats and other transports, he succeeded in discharging his ponderous freight upon the lines of the road for which it was intended, and to him belongs the honor of having blown the first locomotive whistle in the county of Chautauqua, among whose hills and valleys there now resounds and echoes the shrill screech of a thousand locomotives.

For six years Mr. Brooks continued at his post as engineer on the western section of the Erie Road, contributing largely, by an interested performance of his duty, to the road's rapid development. In 1856, he was tendered, and accepted, the position of Master Mechanic of the Ohio & Mississippi Railroad, where he remained four years, when he again returned to Dunkirk, and the Erie service, as Master Mechanic of the Dunkirk shops. Two years later, in recognition of the increasing value of his skill and judgment, he was made Superintendent of the western division of the road, and in 1865 was still further advanced, and became Superintendent of Motive Power and Machinery for the entire road extending from Dunkirk to New York. In 1869, under stress of financial difficulty and for purposes of retrenchment, the management of the Erie determined to close up the Dunkirk shops. Mr. Brooks, throughout his association with the road, held close his personal interest in the community in which his first Erie successes had been achieved, and which had grown, under his eye, to a large and busy town. In order to avert the calamity which now threatened it, he opened negotiations with the Erie Company, with a view of leasing the entire property and plant of the road in Dunkirk,

for the purpose of manufacturing locomotives. His negotiations were successful, the lease was executed, and on the 13th of November the Brooks Locomotive Works was organized with a manufacturing capacity of one locomotive per month. Thus in the brief space of twenty years the progressive engineer of 1849 had become the proprietary head of a great manufacturing interest.

Among the most valuable of the assets of the new enterprise was the limitless faith and untiring energy which its founder brought into play in organizing and administering its affairs. So strong was his belief that the industrial growth of America was still in its infancy, and would advance rapidly and marvelously, that the new company at once adopted a policy of extension in line with that belief. As a result, the capacity of the works had increased to seventy-two engines per year in 1872, and to a manufacturing total of 100 engines per year in 1880. In two years more the output of the works doubled — 200 complete locomotives having been turned out in 1882. In July, 1883, the works purchased from the Erie Company the entire property which it had leased, and commenced at once the erection of extensive additions to the plant. Orders were placed for a large amount of new machinery of improved types, and so well was the work of extension carried on that, in 1885, the manufacturing capacity of the works had reached 250 per year. The success of the works had now become assured, the fine faith and foresight of its founder vindicated. Not only was the plant enlarged to meet the ever-increasing demand for locomotives, but the construction of the locomotives themselves was carried on with even greater attention to the needs and demands of the service required.

On the 20th of April, 1887, Mr. Brooks died. This was a severe blow to his associates, and his loss was felt throughout the entire railroad world. He had builded too well, however, to make himself necessary to the continued success of the works. The company, gathering force from his example, and pursuing his policy of extension, met with increasing prosperity.

Edward Nichols was elected to succeed him as President of the works in June, 1888. The death of Mr. Nichols occurred in January, 1892, and he was succeeded by M. L. Hinman as President, R. J. Gross being elected Vice-President.

At the Columbian Exposition, in 1893, the works exhibited nine locomotives of various types and designs, and were awarded a first medal for excellence of design and workmanship.

April 16, 1894, a Brooks 10-wheeled engine, coupled to a Lake Shore & Michigan Southern Railway train, known as the "Vanderbilt Special," made a speed record of 78 miles per hour. This was eclipsed, however, by the "Fastest of Fast Runs," which was made on the 24th of October, 1895, by a series of Brooks engines, in a run on the Lake Shore & Michigan Southern Railway, with a special train from Chicago to Buffalo, a distance of 540 miles. The average speed of this train, including all stops, was 63.6 miles. The maximum speed attained on the run was made on the Buffalo Division by a Brooks ten-wheeled engine with 17 x 24-inch simple cylinders, as follows :

1 mile at the rate of 92.3 miles per hour.

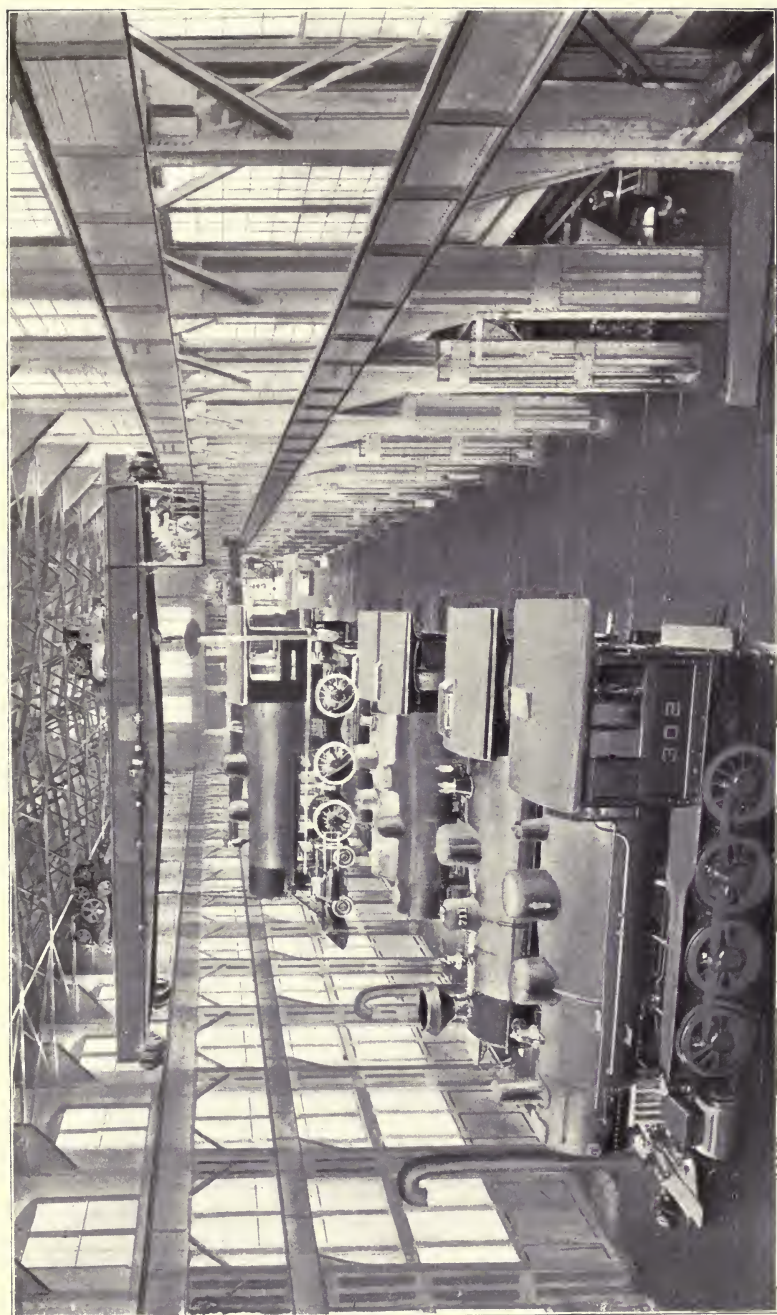
8 consecutive miles at the rate of 85.44 miles per hour.

21 consecutive miles at the rate of 82.44 miles per hour.

33 consecutive miles at the rate of 80.6 miles per hour.

86 consecutive miles at the rate of 72.92 miles per hour.

In 1896, Mr. Hinman's health became so seriously impaired, that he resigned his office, and Frederick H. Stevens was elected President of the works, and remains the active head of its management.



ERECTING SHOP.

From the foregoing it will be seen that the Brooks Locomotive Works, starting in 1869, with a capacity of one engine per month, and having a present capacity of 400 locomotives and upwards per annum, has kept pace with the remarkable industrial progress for which this century has become notable. The plant covers an area of about twenty (20) acres, and comprises some thirty-five buildings, equipped with all modern facilities for the rapid and perfect construction of locomotives. The machine shop proper is about 400 feet long by 100 feet wide, and contains a vast array of planers, lathes, milling machines, slotting machines, boring mills, many of which are electrically driven by motors placed on each machine. A number of the smaller tools, such as drills and hammers, are operated by pneumatic power. A separate machine shop is provided for taking care of the cylinders. This shop is over 200 feet long and about 58 feet wide, and is furnished with some of the largest and most powerful machinery made in this country.

The iron foundry is over 250 feet long by 100 feet wide, and has two thirty-ton cupolas, located near the center of the shop. This foundry is provided with two powerful electric overhead traveling cranes, which traverse the entire length of the building. In the south end are located three large core ovens. All the iron and coke for the cupolas are elevated to the charging floor by means of an electric elevator. Everything in this building is driven by electricity, no steam power being used.

Large and commodious boiler shops of steel construction have recently been constructed. One of these shops is about 450 feet long by 80 feet wide, and the other about 180 feet long by 90 feet wide, and have a total area of about 50,000 square feet. They are splendidly equipped with all the latest improved machinery including one of the most powerful hydraulic flanging presses in the world. This department is also provided with three powerful electric overhead traveling cranes, one of twenty-five tons lifting capacity, one of twenty tons and one of ten tons.

The carpenter shop is 269 feet long by 52 feet wide, and is a model of its kind.

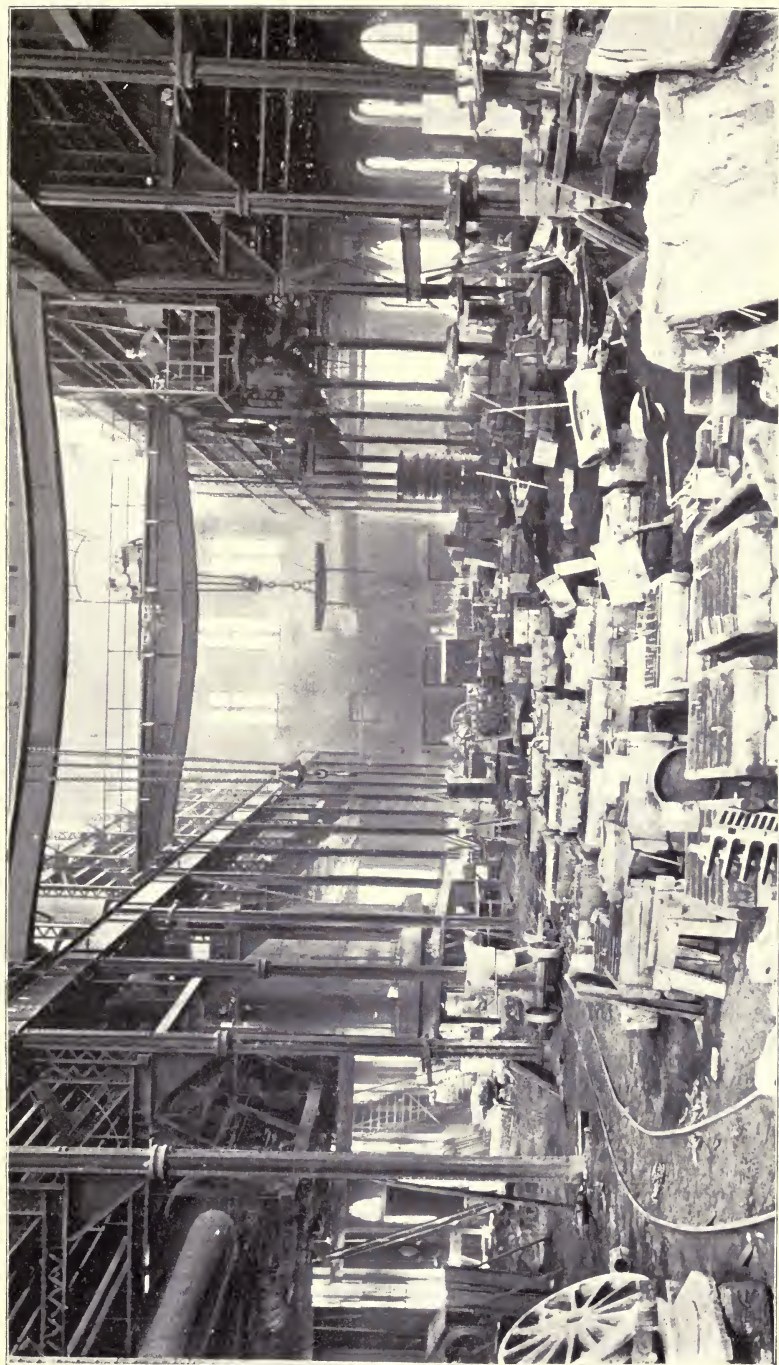
The tank shop is a two-story building, 154 feet long by 65 feet wide.

In the steam-power house are located four batteries of the most modern type of water tube boilers, furnishing about 1,200 horse-power. Adjoining this building is the electric-power house, where all the electricity used in this extensive plant is generated by means of three large generators—one of 500 horse-power, another of 200 horse-power, and the third of 100 horse-power, all directly connected to automatic high-speed engines.

There has recently been added to the plant a new and commodious erecting shop. This new building is of approved and up-to-date design, and a description of its prominent features should prove of some interest to those who favor progressive and advanced methods of manufacture.

The building referred to covers an area of 17,595 square feet, is 255 feet long, 69 feet wide and 60 feet high to apex of roof. The frame of the building is composed wholly of structural steel. The walls above the upper crane runway are of brick, while below the runway the outside wall is wholly of glass, set in substantial frames, the lower tiers of which are arranged on balance weights, thus admitting of their being lifted for the convenient egress and admission of locomotives. The opposite side of the building opens directly into the old erecting shop, thereby more than doubling the floor space heretofore available for the erection of locomotives.

Within the floor space is included sixteen engine pits of brick masonry, four feet wide, and each extending forty feet in length between tracks.



IRON FOUNDRY.

The building is traversed its entire length by two Morgan Engineering Company's latest improved Electric Cranes. The larger of these cranes is of 120 tons capacity, and is equipped with two trolleys of sixty tons capacity each, one of the trolleys having in addition an auxiliary hoist of five tons capacity. This crane has a span of sixty-four feet, and runs upon a 100-lb. rail at a height of thirty-eight feet and one inch from floor, lifting and carrying with ease and rapidity the heaviest locomotives of modern construction. The smaller crane, equipped with two ten-ton trolleys, has a span of sixty-one feet, and runs upon a sixty-lb. rail twenty-seven feet three inches from floor. This crane is used in handling the lighter parts of engines during the process of their erection.

An indirect system of heating and ventilating has been installed, and may be described briefly as follows :

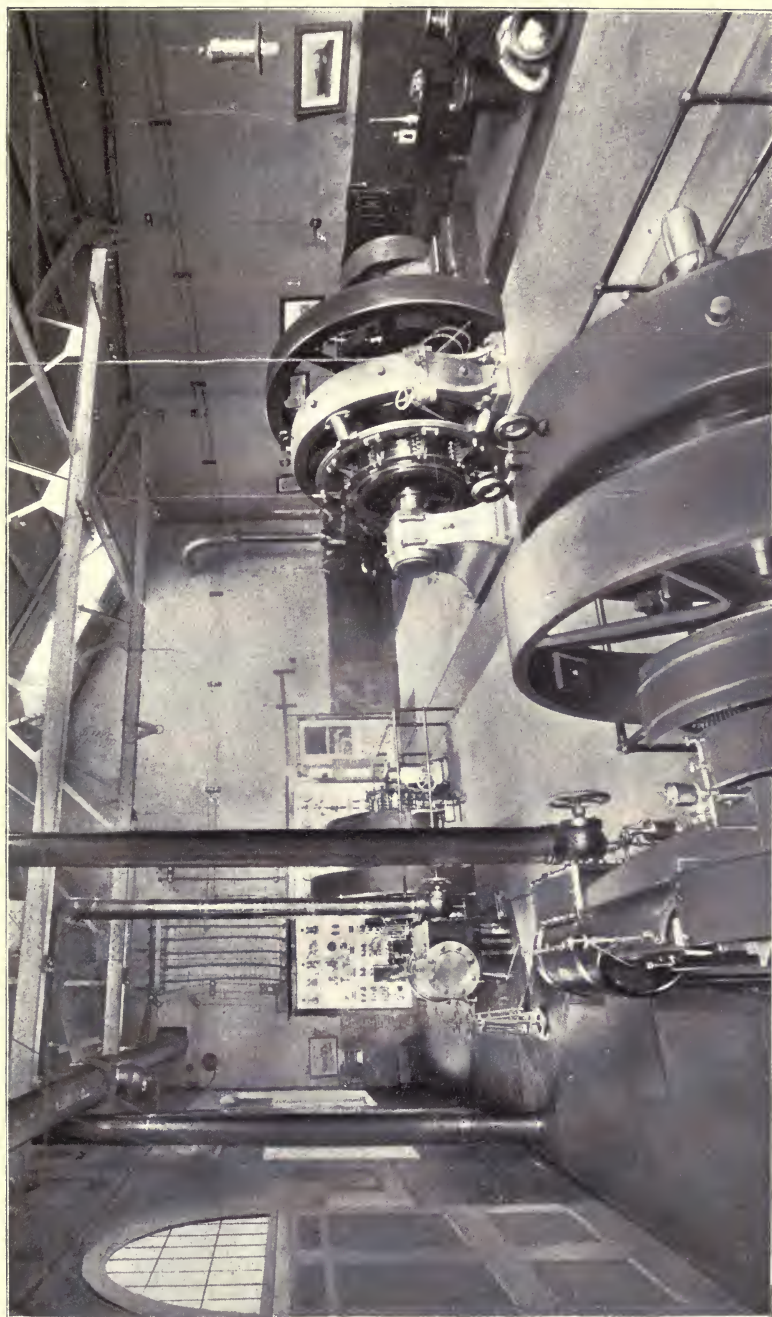
Exhaust steam is passed through a series of iron coils, thereby heating the air, which is passed over and among the coils by means of the suction produced by a large fan, which, in turn, distributes the heated air through two conduits running the full length of each side of the shop. These conduits admit the heated air into the building through openings at each one of the supporting columns of the building, by this means a continuous circulation of air is assured and the building amply heated and ventilated by an effective and economical process.

Not least among the improved processes in use in this new building is the means employed for disposing of the smoke and vapors formed in firing up and testing locomotives during their erection. For this purpose a smoke duct of brick, laid in cement, runs under the floor, and extends the entire length of the building close to and parallel with the end of the several engine pits. In firing, a workman connects the smoke stack of the locomotive with this smoke duct by means of a portable exhaust pipe and elbow, and the smoke and gases are drawn off through the duct and its outlet, by the suction of an exhaust fan operated by an electric motor.

The building is lighted with twenty-two arc lights of 2,000 candle-power, supplied by a Western Electric Generator.

In conclusion, the general extent and capacity of the works may be summed up approximately as follows :

Acreage comprised,	20
Number of buildings,	35
Number of employes,	2 000
Horse-power employed in operation of works,	2,500
Number of dynamos and motors employed in furnishing and transmitting power,	60
Number of electric traveling cranes,	10
Number of incandescent electric lamps in service,	700
Number of arc electric lamps in service,	150
Consumption of coal per week,	400 tons.
Capacity of works per annum,	400 locomotives.



ELECTRICAL POWER HOUSE.

PISTON VALVES.

About two years ago, after proper experimenting, we concluded to introduce the use of valves of the piston type upon our heavier locomotives carrying high pressures, in place of slide valves, as we found with the latter, when made of sufficient size for the large cylinders and high pressures in use upon heavy power, that the wear not only of the valves and seats but also the entire link motion was excessive, and that such engines were hard to handle. We, therefore, adapted to our different types of locomotives our improved form of cylinders having the valve chests cast integral therewith and improved piston valves arranged with internal admission, enabling us to secure the shortest possible steam passage from the top of the cylinder saddle to the admission edges of the valve. This passage or chamber is of extremely large area with a very small surface exposed to external cooling influences, even this portion being jacketed over. The cylinder proper is practically free from the cooling influences which obtain in cylinders provided with slide valves and external steam chests. The steam ports from the valve chest to the cylinder are as short and direct as it is possible to make them, and, on account of this shortening in length, we are enabled to make them of much larger sectional area than is possible in a slide valve cylinder, thereby reducing the loss of pressure due to frictional resistance which is so noticeable in slide valve cylinder engines.

As the result of the foregoing improvements, indicator cards obtained from our locomotives equipped with improved piston valve cylinders show an admission line having a reduction in pressure not exceeding two per cent. of the boiler pressure itself.

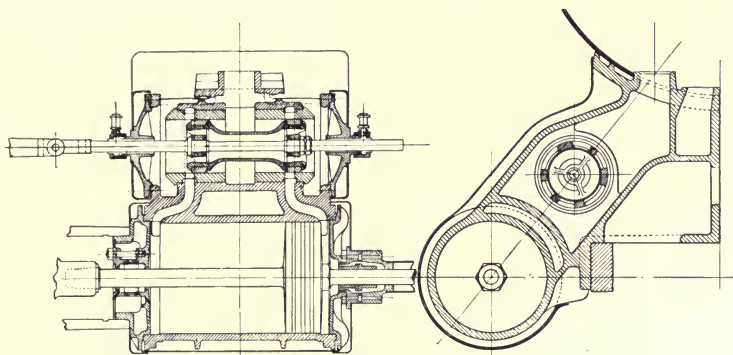
Further, by the use of the improved piston valves, which are absolutely balanced under all conditions, we are enabled to use much larger steam ports than is possible or practicable with slide valves, at the same time putting no unnecessary strain and wear upon the link motion. This increase in the size of the ports permits the use of a longer lap on the valve than is possible with a slide valve, giving the same power at maximum cut-off as with the shorter lap on the slide valve. This combination gives a remarkably free opening on the exhaust side, consequently reducing the back pressure in the cylinder to as low a point as is desirable.

From the foregoing we obtain the following improvements and increase in efficiency :

First.—An increase of pressure on the admission line or positive side of the diagram.

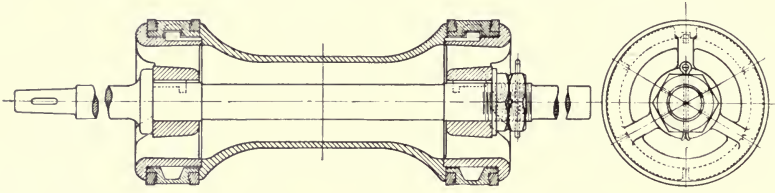
Second.—A decrease of pressure on the exhaust line or negative side of the diagram.

Consequently, as the total efficiency of the engine is rated by the difference between the positive and negative side of the indicator card or diagram, it will readily be seen that the total efficiency or power developed by our piston valve cylinders is considerably higher than is obtainable from slide valve cylinders.



On account of the use of piston valve cylinders, the weights, not only of the cylinders themselves, but also their attachments and the forward end of the frames of locomotives so equipped, are materially reduced, the piston valve cylinders enabling us to secure a design throughout which is not only considerably lighter but also more efficient in every particular than on similar types of engines equipped with slide valve cylinders. This not only applies to the cylinders and allied parts themselves, but also to the frames and link motion. With piston valve cylinders we are enabled to use a very light and yet remarkably strong front end frame, in which the center line of strain, both from the cylinders and also from the draw bar or couplings, is centralized in the frame itself. The design of the piston valve cylinders themselves is such that a saving in weight of metal is effected and at the same time a considerable increase in the strength of the cylinder is obtained. There are also several other minor improvements in the construction of our locomotives equipped with piston valve cylinders which cannot be so readily applied to engines equipped with slide valve cylinders. We have a large number of engines equipped with piston valve cylinders in operation upon various large railroads in the United States and abroad, all of which are carrying from 180 to 210 pounds boiler pressure. The reports of the performance of these engines are most gratifying, both as regards power obtained, economy in fuel, speed, steady riding, easy handling, etc.

The general design of our cylinders, also the construction of the valve and packing, will be noted in the annexed cut.



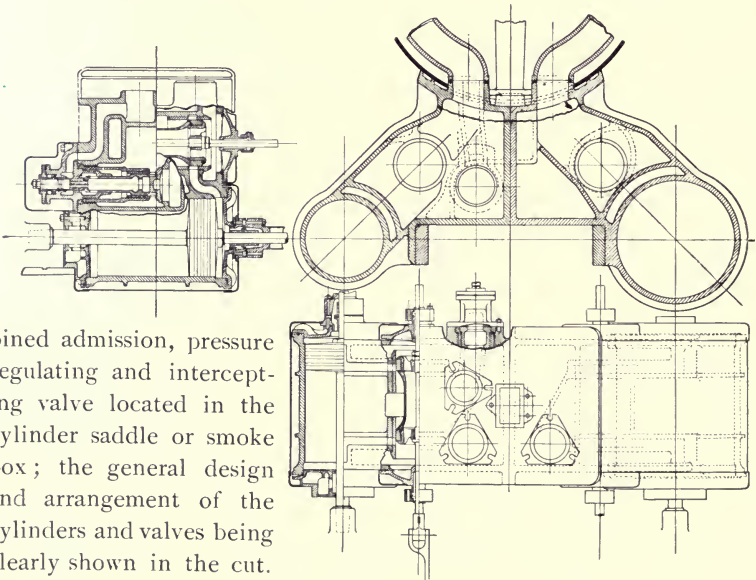
We have lately brought out an adaptation of the marine type of piston valve packing which so far has given us gratifying results. We are also engaged on other improvements in piston valves, which we expect to give even better results.

COMPOUND LOCOMOTIVES.

WE BUILD COMPOUND LOCOMOTIVES OF BOTH THE TWO AND FOUR CYLINDER TYPE.

TWO CYLINDER COMPOUNDS.

Our two cylinder engines are of the usual cross compound receiver type, fitted with a Player patent improved automatic com-



bined admission, pressure regulating and intercepting valve located in the cylinder saddle or smoke box; the general design and arrangement of the cylinders and valves being clearly shown in the cut.

The combined valve admits live steam at reduced pressure to the low pressure cylinder, this pressure being regulated in such ratio as desired, the intercepting valve at the same time automatically closing and preventing the live steam pressures from working against the high pressure piston, the reducing valve remaining open until such time as the pressure in the receiver pipe on the high pressure side of the intercepting valve becomes equal to or slightly in excess of that on the low pressure side, when the pressure regulating valve automatically closes and the intercepting valve opens simultaneously, the first cutting off the supply of live steam to the low pressure cylinder, the second opening connection between the two ends of the receiver and allowing the high pressure exhaust steam to act directly on the low pressure piston and at the same time locking the pressure regulating valve upon its seat and preventing the further admission of direct steam to the low pressure cylinder, these valves remaining in this position during the time the throttle valve is open. In order to give the engineman full command of the locomotive at all times, controlling valves are provided in the receiver, these are usually placed upon the bottom of the receiver, and are connected to the cab by suitable levers; they may, if desired, be of larger area and arranged in the upper portion of the receiver, connected with the exhaust pipe and arranged to work automatically in combination with the intercepting valve, so that the locomotive can be worked as a simple engine when required. However, on account of the arrangement of combined admission and pressure regulating valve, which at all times when necessary admits sufficient steam to the low pressure cylinder to give the locomotive its maximum power, the use of such a separate exhaust valve, whereby the engine can be worked simple for long periods, has been found in practice unnecessary, the arrangement of admission and pressure regulating valve previously referred to automatically performing all the requirements of a simple locomotive.

This valve operates as follows: Live steam operates upon the high pressure piston in the usual manner. At the same time steam is admitted to the high pressure end of the pressure regulating valve through the connecting pipe, causing the valve to open, passing thence through the hollow portion of the valve, causing the intercepting valve to automatically close against its seat. This steam flows through the passages of the intercepting valve into the low pressure end of the receiver and, acting upon the large end of the pressure regulating valve, causes it to partially close as soon as the requisite pressure is obtained, and thereafter regulates the amount of

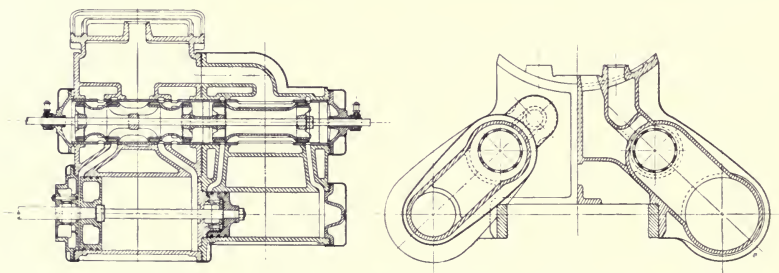
steam admitted by the pressure regulating valve, maintaining an even pressure in the receiver. The reduced pressure steam thus admitted to the receiver acts upon the low pressure piston in the usual manner. As soon, however, as the high pressure cylinder has exhausted sufficient steam into the high pressure end of the receiver to overbalance the intercepting valve, this valve opens automatically, at the same time locking the pressure regulating valve against its seat. The exhaust steam from the high pressure cylinder then flows through the receiver and acts directly upon the low pressure piston, the pressure of this exhaust steam, even when considerably reduced, being sufficient to keep the pressure regulating valve closed through the action of the combined valves at all times.

We build these engines, either with slide valves or improved piston valves as shown in cut, as desired.

This type of compound has been in successful operation for the past eight years.

FOUR CYLINDER COMPOUNDS.

Our four cylinder compounds are the Player patent tandem type, in which the low pressure cylinders and steam chests are attached to the smoke-box in the usual place and manner, and the high pressure cylinders and steam chests are attached preferably to the forward end of the low pressure cylinders, and having steam chests communicating with the steam chests of the low pressure cylinders. The steam is supplied to the high pressure valve chests through suitable connecting pipes, and the low pressure cylinder exhausts through the saddle in the usual way. The high pressure steam chests are fitted with hollow piston valves having internal admission, the low pressure



steam chests being also fitted with internal admission piston valves as shown in annexed cut.

One of the chief advantages of this type of compound is that the castings for the tandem compound cylinders are and can always

be made absolutely interchangeable with those of a simple engine, this arrangement necessitating no change whatsoever back of the crosshead and valve rod keys or in the steam and exhaust pipes in the smoke-box, the compound cylinders thus giving no more cost for application than would be the case in applying a new pair of simple cylinders to an engine.

The high pressure cylinder is generally located ahead of the low pressure. This, however, is not necessary, and in some types of locomotives having four-wheel trucks it is preferable to place the high pressure cylinder back of the low pressure, thus materially reducing the weight and rendering the parts more accessible. The pistons of the high and low pressure cylinders are arranged upon the same rod, and the intermediate head between the high and low pressure cylinders is fitted with suitable metallic packing. The low pressure steam chest is provided with a reducing and starting valve connecting with the high pressure steam pipe. This valve is permitted to operate automatically when the reverse lever is in full forward or full back gear. In the intermediate positions of the lever, this reducing valve is locked to its seat so that it is rendered inoperative, and the engine must necessarily work compound at all times under all conditions of steam pressure when the reverse lever is in any other position except full gear. The use of this combined starting and reducing valve permits the introduction of steam into the low pressure cylinder at an equivalent to the maximum pressure obtained in this cylinder when the engine is working compound. Of course, as soon as the engine has made one revolution and the receiver is charged with exhaust steam from the high pressure cylinder, the starting valve becomes inoperative, thereby necessitating the engine to work compound.

The reducing and starting valve being automatic, responds absolutely to all variations of pressure and allows the engine to start without jerking or slipping, as is the case when high pressure steam is wire drawn into the low pressure cylinder.

We also have other types of valve gear for this engine, one with external admission valves, and another in which the high pressure valve has internal admission and the low pressure valve external.

This type of compound has been in successful operation for the past seven years.

TABLES.

We append three tables relating to compound locomotives.

Table A giving the relative diameters of cylinders for simple and compound locomotives, assuming the same boiler pressures. The ratio between high pressure and low pressure cylinder volumes for two cylinder compounds being 1—2.25, and for four cylinder compounds 1—3.5, these being the most desirable ratios at the prevailing pressures.

Table B gives the relative diameters of cylinders of simple engines and two cylinder compounds for various boiler pressures.

Table C gives the same information for four cylinder compounds.

TABLE A.

COMPOUND CYLINDERS.

Relative Diameters of Cylinders for Simple and Compound Locomotives.

SIMPLE ENGINES		TWO CYLINDER COMPOUNDS		FOUR CYLINDER COMPOUNDS	
DIAMETER OF CYLINDERS		DIAMETER OF HIGH PRESSURE CYLINDERS	DIAMETER OF LOW PRESSURE CYLINDERS	DIAMETER OF HIGH PRESSURE CYLINDERS	DIAMETER OF LOW PRESSURE CYLINDERS
10		11	$16\frac{1}{2}$	7	13
11		12	18	8	15
12		13	$19\frac{1}{2}$	9	17
13		$14\frac{1}{2}$	22	$9\frac{1}{2}$	18
14		$15\frac{1}{2}$	$23\frac{1}{2}$	10	$18\frac{1}{2}$
15		$16\frac{1}{2}$	25	11	$20\frac{1}{2}$
16		$17\frac{1}{2}$	$26\frac{1}{2}$	12	$22\frac{1}{2}$
17		19	$28\frac{1}{2}$	$12\frac{1}{2}$	$23\frac{1}{2}$
18		20	30	13	$24\frac{1}{2}$
19		21	$31\frac{1}{2}$	14	26
20		22	33	$14\frac{1}{2}$	27
21		23	$34\frac{1}{2}$	$15\frac{1}{2}$	29
22		24	36	16	30
23		25	$37\frac{1}{2}$	17	32
24		26	39	$17\frac{1}{2}$	33

TABLE B.
RELATIVE DIAMETERS OF CYLINDERS.
FOR TWO CYLINDER COMPOUND.

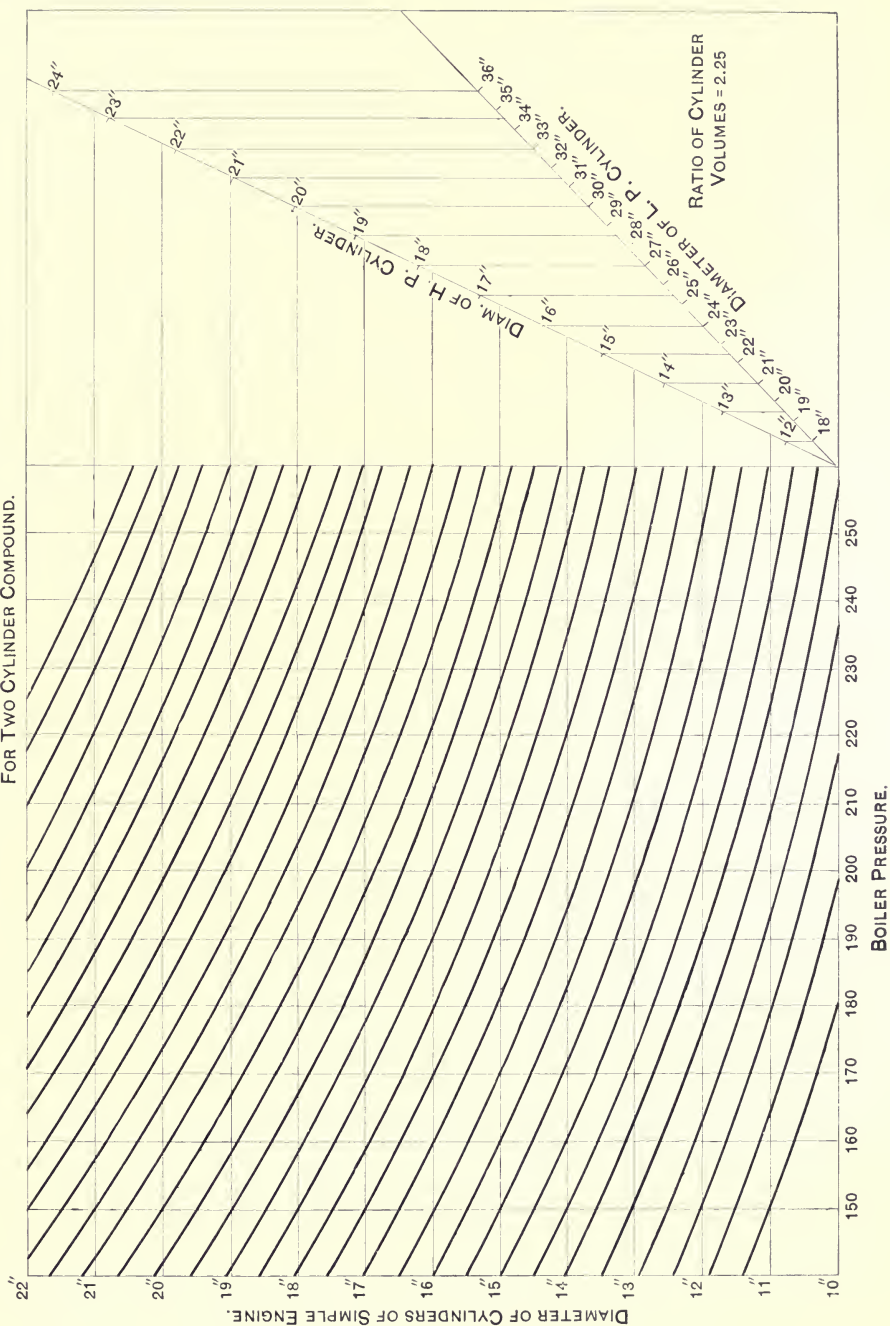
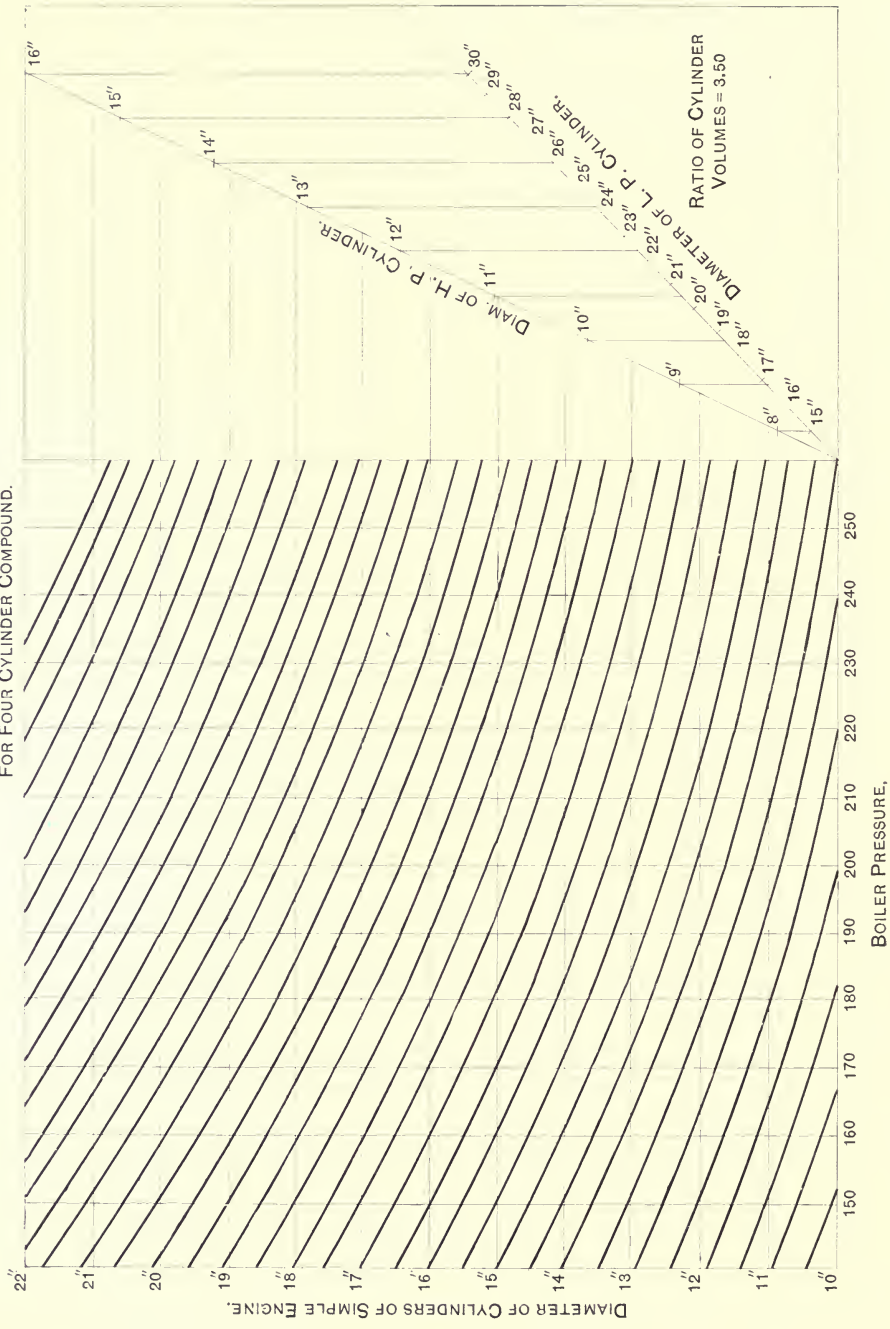


TABLE C.
RELATIVE DIAMETERS OF CYLINDERS.
FOR FOUR CYLINDER COMPOUND.



SPECIFICATIONS.

We give below the form of specification used by the Brooks Locomotive Works. It will be noted that this does not elaborate on specific methods of construction, it being well known that these vary with different conditions and in the various localities for which our locomotives are constructed. It is our aim to meet the views of our patrons and to furnish locomotives well designed, properly proportioned and carefully constructed, in *all* their parts, of the best material and finish, in a workmanlike manner. We are constantly making improvements, and do not hesitate to immediately adopt the latest and best features. By so doing our locomotives are always up to date and as efficient as it is possible to make them.

BROOKS LOCOMOTIVE WORKS,

DUNKIRK, N. Y., U. S. A.,

DESIGNERS AND BUILDERS OF STRICTLY HIGH-GRADE LOCOMOTIVES.

SPECIFICATION

OF A
LOCOMOTIVE ENGINE.

No. 189 .

FOR THE

TYPE CLASS

WITH WHEELED TENDER TANK CAPACITY U. S. GALLONS AND TONS FUEL.

CYLINDERS			WHEELS								BOILER		FIRE BOX		
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
BOILER PRESSURE		FUEL		LIMITATIONS								GAUGE OF TRACK			
POUNDS		KIND		WEIGHT PER AXLE		WEIGHT ON DRIVERS		TOTAL WEIGHT		HEIGHT		WIDTH		LENGTH	
												TOTAL WHEEL BASE		FEET INCHES	

GENERAL DESIGN SHOWN BELOW.

PHOTO. OF ENGINE NO.

CATALOGUE PAGE NO.

DIAGRAM, SHEET NO.

CARD OR SKETCH NO.

DETAILED SPECIFICATION.

BOILER.	Of the "Crown Bar," "Radial Stayed," or Improved "Belpaire" type, built straight or wagon top with conical connection. Dome of suitable size, located to suit construction.....Waist.....inches diameter.
MATERIAL.	Material of shell, best homogeneous boiler steel.....Thickness of plates.....
CONSTRUCTION.	Boiler well designed, carefully constructed, substantially riveted and thoroughly braced in all its parts, having an ample factor of safety to carry the working pressure, plates planed at edge and caulked with round nosed pneumatic tool, tested by water to 40 per cent. and by steam to 25 per cent. above the working pressure.
TEST.	
RIVETING.	Longitudinal seams quadruple, quintuple or sextuple riveted, according to location, size and pressure; rivets of suitable sizes for the thickness of plates.
FIRE-BOX.	Of the deep, sloping or long type, between or over frames.....long and .....wide inside sheets.
MATERIAL.	Plates of best homogeneous fire box steel, thoroughly annealed after flanging..... Flue sheet..... $\frac{1}{2}$ crown sheet..... $\frac{3}{8}$, side sheets..... $\frac{1}{8}$ or $\frac{3}{8}$, back sheet..... $\frac{1}{8}$ or $\frac{3}{8}$ inches thick.
MUD RING.	Accurately fitted and substantially.....riveted, water space..... inches front, .....inches sides and.....inches back at bottom, increasing gradually towards crown.....
STAY-BOLTS.	Of best double refined iron.....1-inch diameter, ..... .....spaced not over.....4.....inches from center to center, screwed in and riveted over sheets at both ends, ends drilled with test holes.
CROWN STAYS.	Crown sheet securely supported by crown bolts with conical neck and head under sheet, radial or direct stays with heads under sheet screwed into sheets from inside and riveted over on outside, and spaced not over $4\frac{1}{4}$ inches from centre to centre. Crown bars of suitable size, each formed from two bars of iron welded together at ends and spaced not over..... $5\frac{1}{4}$.....inches from centre to centre, raised a suitable distance above crown sheet and separated therefrom by conical thimbles or ferrules, ends of bars having solid bearing on side sheets, bars secured to roof sheet by slings.....
FLUES.	Of best lap welded charcoal iron or steel.....in number, .....inches external diameter, thickness No.....B. W. G., length over sheets .....feet.....inches. Spaced in vertical rows and set with copper ferrules on fire box end, both ends carefully beaded with pneumatic tool.....
BRICK ARCH.	Fire brick arch supported on studs.....
WASHOUT PLUGS, ETC.	Blow off cock in bottom of fire box leg, suitable washout plugs in corners and sides of fire box, in front end and above crown sheet.
THROTTLE VALVE AND STEAM PIPES.	Cast iron balanced throttle valve in dome, .....large wrought iron dry pipe attached to suitable tee head and cast iron steam pipes in smoke box.....
EXHAUST PIPE.	Exhaust pipe in smoke box of cast iron, with suitable nozzles.....
SMOKE BOX.	Short extension smoke box, with suitable netting, deflector and cinder valve, front and door flanged steel.....
STACK.	Straight or taper pattern of cast iron or sheet steel with flanged base.....
GRATES.	Suitable for the fuel. Cast iron, rocking pattern; operated from cab.....
ASH PAN.	Suitable for the fuel. Arranged with suitable cleaning holes; dampers front and rear operated from cab.

DETAILED SPECIFICATION.—(Continued.)

FRAMES.	Of best hammered iron. Main frames and pedestals forged solid, accurately planed and slotted. Front frames securely spliced to main frames. Pedestal tie bars well secured to frames.....
BRACES.	Frames thoroughly braced together and to boiler by suitable castings, braces, expansion plates and pads.....
TRUCKS.	Leading truck of the.....wheel type, with swiveling and swing centre or swing centre and radial bar.
LEADING WHEELS.	Leading truck wheels.....inches nominal diameter..... Axles of hammered iron or steel, journals.....inches diameter, inches long..... Trailing truck of the.....wheel type, with swiveling and swing centre and radial bar.
TRAILING WHEELS.	Trailing truck wheels.....inches nominal diameter..... Axles of hammered iron or steel, journals.....inches diameter.....inches long.
TRUCK FRAMES.	Of wrought iron, pedestals of wrought or cast iron. Boxes of cast iron with heavy brass or bronze bearings.....
DRIVERS.	Driving wheels.....in number, .....inches diameter outside of tires.
WHEEL CENTRES.	Of cast iron or steel.....inches diameter, well designed, properly proportioned and carefully counterbalanced.....
TIRES.	Driving tires of best open hearth steel.....3.....inches thick when finished. 1st, 2d, 3d, 4th pairs flanged 5½.....inches wide..... 1st 2d, 3d, 4th pairs plain 6.....inches wide.....
AXLES.	Driving axles of hammered iron or steel, .....journals.....inches diameter, .....inches long.....
BOXES.	Driving boxes of cast iron or steel.....with heavy brass or bronze bearings carefully fitted, provided with shoes and adjustable wedges.
SPRINGS.	All springs under engine of the best crucible cast steel properly proportioned for their loads.....
EQUALIZATION.	Spring rigging and equalization of the best design to secure easy riding. All bearings thoroughly hardened.
CYLINDERS.	Slide valve pattern or improved piston valve type. Horizontal, outside connected .....high pressure.....inches diameter, .....low pressure.....inches diameter, .....inches stroke, of close grained hard cast iron, each with half saddle, carefully fitted together and perfectly interchangeable.....
HEADS AND CHESTS.	Cylinder heads of cast iron....., steam chests of cast iron....., covers of cast iron.....
PISTONS.	Of cast iron or steel.....fitted with approved form of cast iron packing rings.
PISTON RODS.	Of hammered steel.....carefully ground and securely fastened to pistons and crossheads.....
PACKING.	Metallic packing on piston rods and valve stems.....
VALVE MOTION.	Approved shifting link type, graduated to cut off equally at all points. Valves.....balanced slide valve or improved piston type..... Links, blocks, lifters, jaws and pins of hammered iron.....thoroughly case hardened. Rockers hammered iron or cast steel, reverse shaft wrought iron or cast steel, reverse lever with finely graduated quadrant.....
ECCENTRICS.	Of cast iron keyed to axles, straps of cast iron.....carefully fitted.....
GUIDES.	Of hammered iron or steel case hardened, securely bolted to cylinder heads and to heavy hammered iron guide yoke extending across frames. Guides and cross-heads.....type.
CROSS-HEADS.	Of cast steel with heavy brass or bronze bearings.....
RODS.	Connecting rods of hammered iron or steel, with straps, wedges or keys and brasses. Coupling rods of hammered iron or steel, with straps, wedges or keys and brasses .....or solid ends with heavy bushings properly secured.
CRANK PINS.	Of hammered steel of ample proportions.....

DETAILED SPECIFICATION.— (Continued.)

CAB.	Engine cab well designed and substantially built of seasoned hard wood..... roof of pine covered with tin plate, or constructed of steel with double roof, .....well arranged sash and doors of cherry, glazed with double thick American crystal glass; well braced and securely fastened to engine.
	Cab conveniently arranged for engineman and fireman, with roomy deck ..........and provided with comfortable seats, seat cushions and arm rests, clothes and tool boxes and signal gong.
RUN-BOARDS.	Suitable run-boards of hard wood, or run-plates of steel with steel nosings, extending from cab to front end.
STEPS.	Engine provided with convenient and safe steps and grab handles wherever required.
HANDRAILS.	Neat, well arranged and safe handrails of suitable size.
BUMPERS.	Substantial bumper beams, securely attached to frames, of oak, iron or steel, neatly finished, on front and rear ends.....
PILOT.	Made of well seasoned hard wood.....well bolted to bumper and thoroughly braced.....
COUPLERS.	Suitable drawheads or couplers, securely attached to bumpers front..... and rear.....

MOUNTINGS.	Engine provided with.....sand box.....with suitable pipes..... .....operated from cab.
	Bell.....whistle, and necessary attachments for headlights, signal lamps and flag holders.....
FITTINGS.	Steam gauge, .....water gauge, gauge cocks, steam and water gauge lamps, blower valve....., cylinder cocks, port cocks and drain cocks in all exposed pipes. All cocks and valves in cab attached to separate turret connected to dome. All fittings, handles and levers in cab arranged in the most convenient manner.
LUBRICATION.	All bearings on engine provided with suitable means for their proper lubrication, adjustable oil cups of ample capacity provided where required.
	Cylinders and valves oiled from cab through copper pipes under jacket by improved.....sight feed lubricator.....
FEED WATER.	Supplied by two improved injectors of proper capacity, with suitable steam, feed and check valves and well arranged piping.....
SAFETY VALVES.	Two.....improved locomotive pop valves of suitable size, located in dome cover or auxiliary turret, .....carefully tested and set to blow at two and three pounds above working pressure.

TOOLS.	A complete set of engine tools provided. Two screw jacks with levers, heavy steel pinch bar, small bar, machinists' hammer, soft hammers, two monkey wrenches, complete set of spanner wrenches to fit all nuts on engine, plug and flat wrenches, injector and packing wrenches, packing tools, chisels, pin punches.
	One set of engine oilers and oil cans, torch, torch holder, etc.
	One set firing tools, scoop shovel, coal pick, slice bar, clinker hook, ash hoe, pail and broom.

LAGGING.	Boiler and dome lagged with....., cylinders and chests lagged with.....
FINISH.	Boiler jacket and bands.....planished iron. Neat dome casing with painted iron body with cast iron top and bottom rings, or flanged steel casing, sand box casings to match dome.....
	Cylinder head casings, pressed steel painted.....
	Steam chest, cover casings cast iron or pressed steel painted. Cylinder and steam chest side casings of sheet iron or steel painted.....
PAINTING.	Engine to be well painted and varnished, and lettered and numbered, as required.

DETAILED SPECIFICATION.—(Continued.)

[illegible]

BROOKS LOCOMOTIVE WORKS,

DUNKIRK, N. Y., U. S. A.

PHYSICAL AND CHEMICAL TESTS OF MATERIAL.

GENERAL.	All material used in constructing locomotives which does not fill the following requirements will be rejected. Notwithstanding these tests, should any defects develop in process of working the material will be rejected.				
NOTE.	Tensile strength is in pounds per square inch. Elongation is percentage in a test strip 8 inches long.				
BOILER SHELL STEEL.	All plates must be made of open hearth process steel: Tensile strength desired 56,000 pounds, minimum 52,000 pounds, maximum 60,000; elongation desired 27 per cent., minimum 25 per cent.; reduction of area 50 per cent.				
FIRE BOX STEEL.	All plates must be made of open hearth process steel: Tensile strength desired 55,000 pounds, minimum 52,000 pounds, maximum 58,000 pounds; elongation desired 28 per cent., minimum 26 per cent.; reduction of area 56 per cent.				
ANALYSIS.	Chemical analysis for fire box steel:				
	Carbon.	Phosphorous.	Manganese.	Sulphur.	Silicon.
	Desired,	.18	.03	.40	.02
	Maximum,	.25	.03	.45	.035
	Minimum,	.15			
TESTS.	Shell and fire box plates must be free from all mechanical defects, and a test piece must, without annealing, bend over on itself, cold, and after being heated to a cherry red and quenched in water, at 80 degrees, show no signs of cracks or flaws on outside edge.				
BOILER FLUES.	All iron or steel flues must conform to specification, must be free from all imperfections, and must be rolled accurately to size. A test piece, 1¼ inches long, cut from any flue, set on end and hammered down to ⅞-inch, must show no longitudinal cracks and must show no transverse cracks when solid. Each and every flue must be tested by the makers to an internal hydraulic pressure of at least 500 pounds per square inch.				
STAY BOLT IRON.	All iron for stay-bolts must be double refined, rolled perfectly round, and true to standard gauges and permit cutting a clean sharp thread. Minimum tensile strength 48,000 pounds; minimum elongation 25 per cent. A test piece, 24 inches long, must stand bending double, both ways, without showing fracture or flaw.				
BAR IRON.	All bar iron not exceeding 1½ inches diameter and rectangular sections not exceeding 2 square inches area; tensile strength desired 49,000 pounds, minimum 48,000 pounds; elongation desired 22 per cent., minimum 20 per cent. and must not show granular fracture.				
	Bar iron of larger size; tensile strength, minimum 46,000 pounds; elongation, minimum 20 per cent.				
STEEL FORGINGS.	All steel forgings must be made from blooms of open hearth process steel, containing not over 5 per cent. phosphorous; test strips to be cut from forgings 2 inches square, hammered from blooms.				
AXLES AND PINS.	Steel for axles, crank pins, etc.: Tensile strength desired 80,000 pounds, minimum 75,000 pounds, maximum 85,000 pounds; elongation desired 18 per cent., minimum 14 per cent.				
RODS.	Steel for rods: Tensile strength, minimum 70,000 pounds, maximum, 80,000 pounds; elongation, minimum 16 per cent.				
STEEL CASTINGS.	All steel castings must be made by the open hearth process, must have smooth, uniform surface, must be entirely free from blow holes, sand, shrinkage and cracks; tensile strength desired 70,000 pounds, minimum 60,000 pounds; elongation desired 18 per cent, minimum 13 per cent.				
CHILLED WHEELS.	All chilled wheels must conform to specifications of the M. C. B. and A. R. M. M. Associations, and be guaranteed 40,000 miles for 28-inch wheels, 45,000 miles for 30-inch wheels, 50,000 miles for 33-inch wheels.				

CLASSIFICATION OF LOCOMOTIVES.

We give below classification of locomotives adopted by the Brooks Locomotive Works. Whilst the classification symbols are not arranged consecutively on account of their being an outgrowth of an earlier designation, yet it will be found by reference to the key that all engines having a similar arrangement of machinery are designated by the same fundamental symbol, the suffixes as noted below being explanatory of additional rear truck or trailers and the type of water tank employed when a separate tender is not used.

CLASSIFICATION.

The first capital letter designates the class of locomotive and indicates the general construction of the engine.

The second capital letter indicates that the engine is arranged with trailing wheels or truck.

The letter "P" represents one pair trailers or two-wheel truck, "Q" four-wheel trailing truck, and "R" a six-wheel trailing truck.

When only capital letters are used to designate the class, this indicates that the engine is provided with a separate tender.

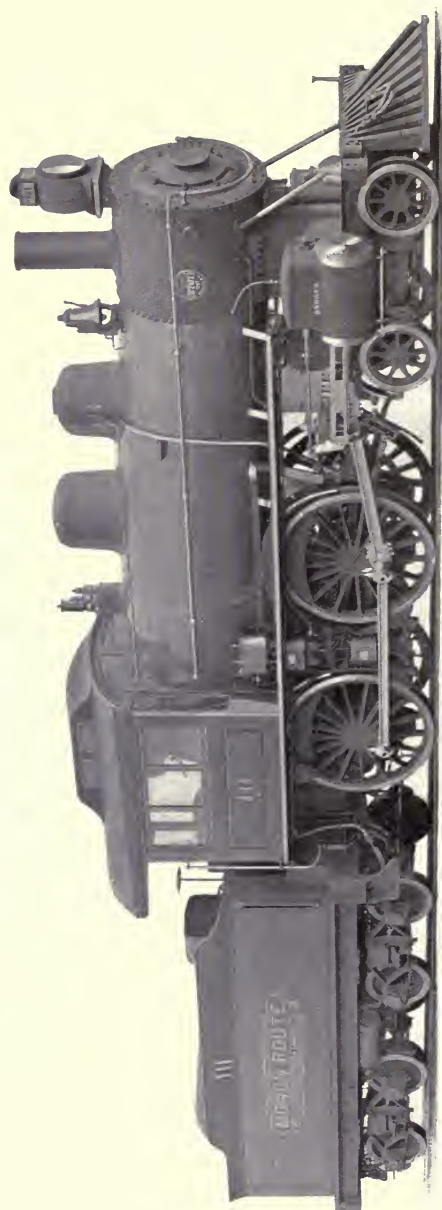
The small letters represent that the engine has no tender, but that the water and fuel is carried in tank and coal bunk attached to engine.

The letter "T" represents a saddle tank, "X" a rear tank, "Y" side tanks.

When any two of these letters are used in combination they represent that the engine is provided with tanks of both kinds which these letters designate.

There are twelve primary classes represented by the letters A to L inclusive, as under noted.

A.	8-Wheel Engine with	4 Coupled Wheels and	4-Wheel Leading Truck.
D.	10-Wheel " "	6 Coupled " "	4-Wheel " "
F.	12-Wheel " "	8 Coupled " "	4-Wheel " "
G.	14-Wheel " "	10 Coupled " "	4-Wheel " "
J.	6-Wheel Engine with	4 Coupled Wheels and	2-Wheel Leading Truck.
B.	8-Wheel " "	6 Coupled " "	2-Wheel " "
C.	10-Wheel " "	8 Coupled " "	2-Wheel " "
K.	12-Wheel " "	10 Coupled " "	2-Wheel " "
E.	4-Wheel Engine with	4 Coupled Wheels and	No Leading Truck.
H.	6-Wheel " "	6 Coupled " "	" " " "
I.	8-Wheel " "	8 Coupled " "	" " " "
L.	10-Wheel " "	10 Coupled " "	" " " "



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1897

FOR THE CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY.

CODE WORD, QUAGGA.

TYPE, 8-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

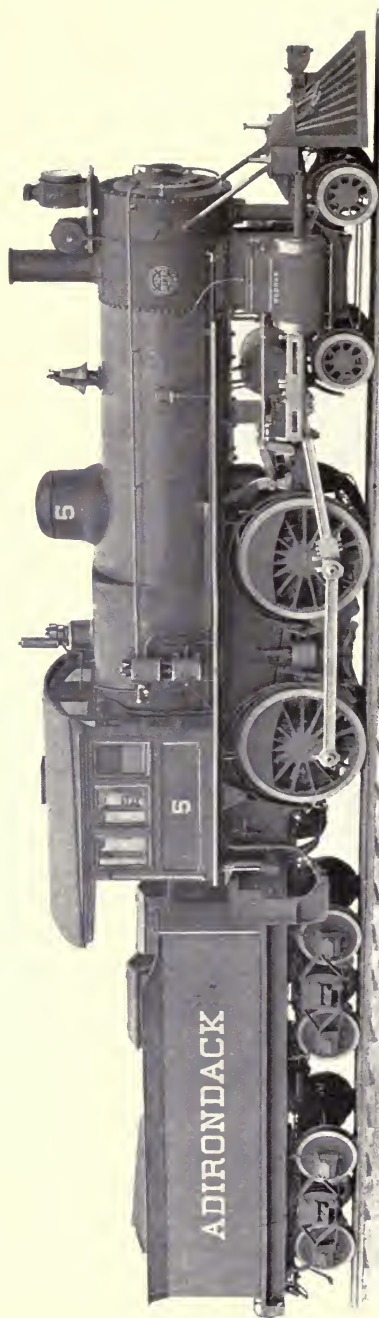
SERIES, 604.

CLASS, 18½ A.

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX						
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH		
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.								
Simple			18½"	24"	8	33"	—	—	4	72"	4	33½"	Rad. Stay, Wagon Top	62"	Long, Wide Sloping	97"	41"	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS										
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE							
300	2"	11'-6½"	8'-6"	8'-6"	23'-5"	48'-4"	89000	—	79000	42800	121800							
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.						GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES		FIRE BOX		ARCH PIPES		TOTAL		SQUARE FEET		METRES		FEET INCHES	
190			Bituminous Coal		1804.4		145.6		—		1950		26.8		1.435		4'-8½"	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1897

FOR THE ST. LAWRENCE & ADIRONDACK RAILWAY.

CODE WORD, QUAHOG.

TYPE, 8-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

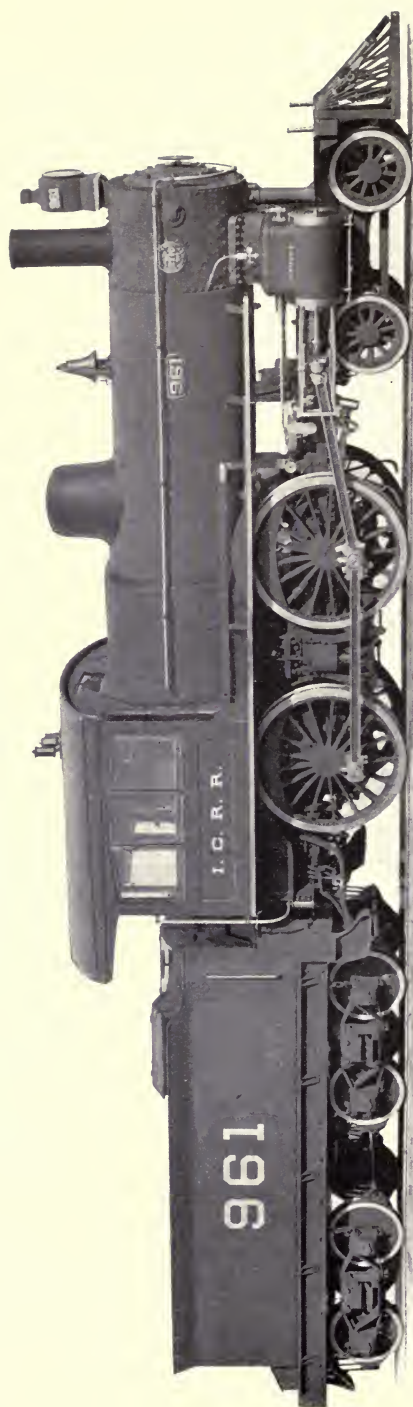
SERIES, 606.

CLASS, 18 A.

TANK CAPACITY 4200 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING	TYPE	LENGTH | WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.			
Simple	18"	26"	8	33"	—	—	4	64"	4	28"	107 ³ / ₈ " 40 ⁷ / ₈ "
<div>FLUES</div> <div>WHEEL BASE</div> <div>AVERAGE WEIGHT IN WORKING ORDER, POUNDS</div>											
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
274	2"	11'-7 ¹ / ₈ "	8'-6"	8'-6"	23'-7"	49'-4"	89000	—	80000	42300	122300
<div>BOILER PRESSURE</div> <div>FUEL</div> <div>HEATING SURFACE, Sq. Ft.</div> <div>GRATE AREA</div> <div>GAUGE OF TRACK</div>											
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PILES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
200			Bituminous Coal	1646.7	154.2	13.26	1814.16	30.4	1.435	4'-8 ¹ / ₂ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1896
 FOR THE ILLINOIS CENTRAL RAILROAD.

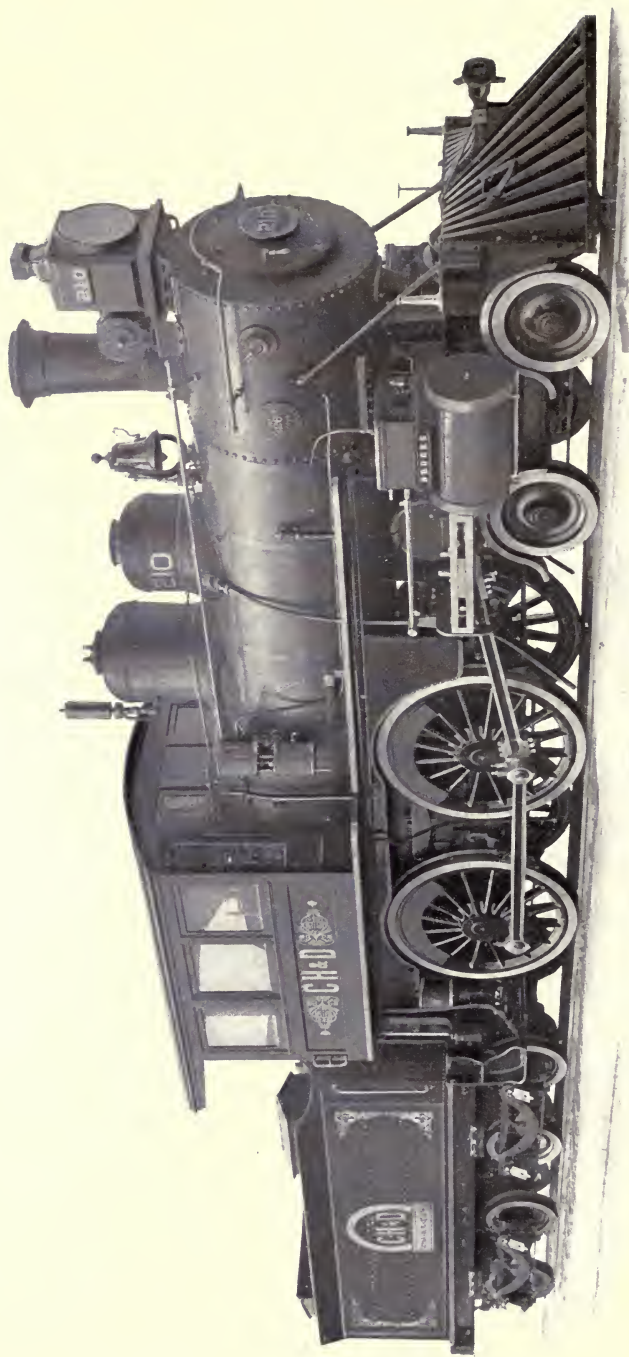
CODE WORD, QUAIL.
 TYPE, 8-WHEELED PASSENGER.
 WITH 8-WHEELED TENDER

SERIES, 590.
 CLASS, 18 A.

TANK CAPACITY 4200 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple		18"	26"	8	38"	—	—	4	75"	4	36"	Improved Belpaire	62"	107 ⁵ / ₈ "	36 ³ / ₈ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
274	2"	11'-7 ¹ / ₈ "	8'-9"	8'-9"	23'-7"	50'-6"	90000	—	80000	40000	120000				
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES		FEET		INCHES
200				Bituminous Coal	1649.4	152.2	—	1801.6	27.2		1.435		4'-8 ¹ / ₂ "		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1893
FOR THE CINCINNATI, HAMILTON & DAYTON RAILWAY.

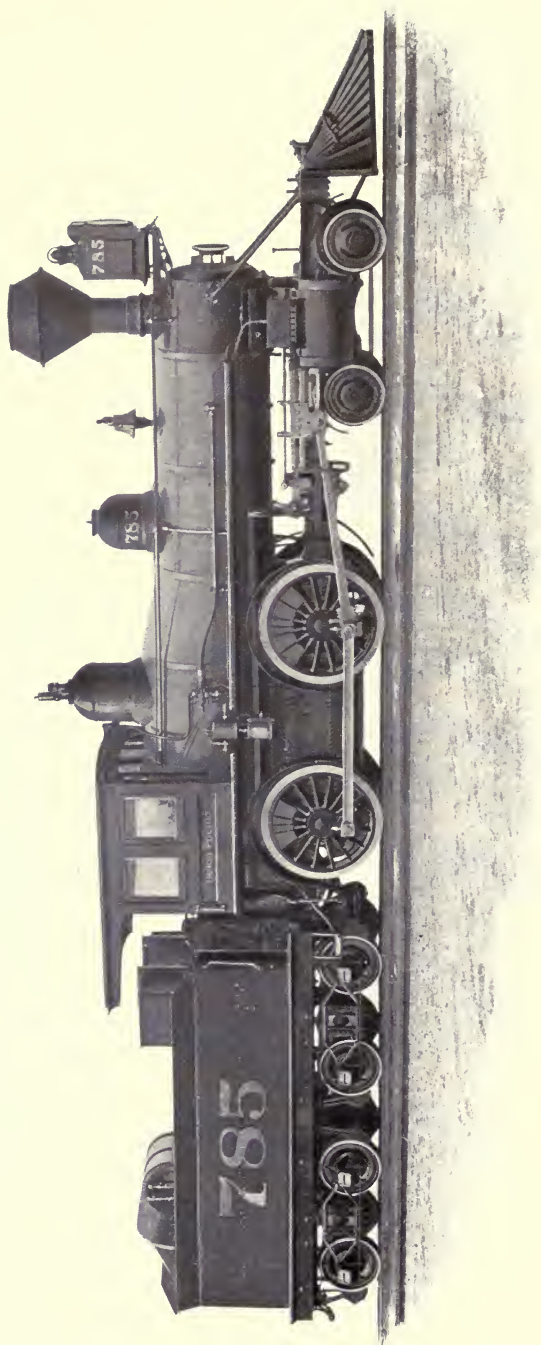
CODE WORD, QUAKER.
TYPE, 8-WHEELED PASSENGER.
WITH 8-WHEELED TENDER

SERIES, 486.
CLASS, 18 A.

TANK CAPACITY 4200 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX							
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH			
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.								
Simple		18"	26"	8	33"	—	—	4	73"	4	33"	Improved Belpaire	58"	Long, Sloping	102"	32"			
FLUES				WHEEL BASE						AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE								
226	2"	11'-7"	8'-0"	8'-0"	22'-8"	46'-8"	90000	—	74000	38000	112000								
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.				GRATE AREA				GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND				FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
180				Bituminous Coal				1372	133	19	1524	22.6	1.435	4'-8½"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

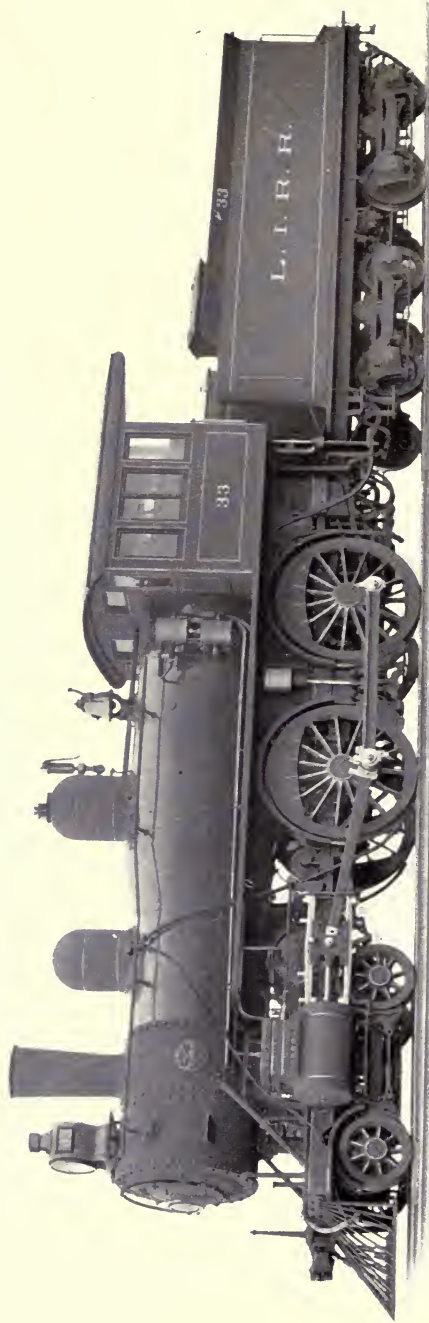
1888
FOR THE UNION PACIFIC RAILROAD.

CODE WORD, QUAMOR.
TYPE, 8-WHEELED PASSENGER.
WITH 8-WHEELED TENDER

SERIES, 293.
CLASS, 18 A.
TANK CAPACITY 2900 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple		18"	26"	8	33"	—	—	4	63"	4	30"	Crown Bar, Wagon Top		Deep	73"	35"	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
201	2"	12'-6"	8'-10"	8'-10"	24'-9"	46'-2 $\frac{1}{4}$ "	67000	—	63000	37000	100000						
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.				GRATE AREA				GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET		INCHES				
150				Bituminous Coal	1315	111.	—	1426	17.55	1.435	4'-8 $\frac{1}{2}$ "						

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1898

FOR THE LONG ISLAND RAILROAD.

CODE WORD, QUARRY.

SERIES, 639.

TYPE, 8-WHEELED PASSENGER.

CLASS, 18 A.

WITH 8-WHEELED TENDER

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS

WHEELS

BOILER

FIRE BOX

TYPE	DIA.	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA	TYPE	LENGTH	WIDTH
		NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	18"	24"	8 33"	—	—	4	67"	4	30"	Rad. Stay, Wagon Top	56"	Long, Wide Sloping	132 ⁹ / ₄ "	42 ³ / ₄ "

FLUES

WHEEL BASE

AVERAGE WEIGHT IN WORKING ORDER, POUNDS

NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
225	2"	11'-5 ¹ / ₈ "	7'-6"	7'-6"	22'-0"	48'-5"	85000	—	81500	33500	115000

BOILER PRESSURE

FUEL

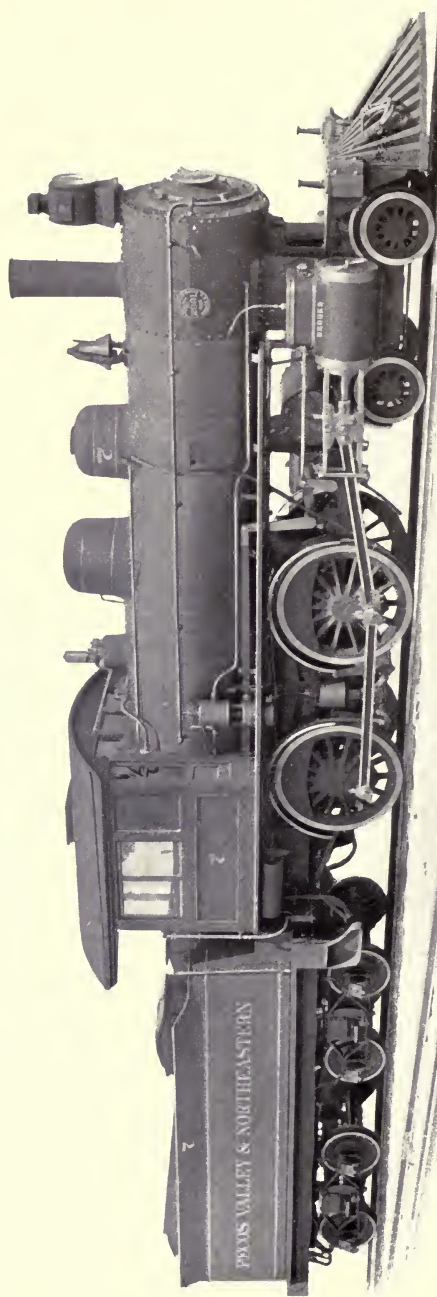
HEATING SURFACE, Sq. Ft.

GRATE AREA

GAUGE OF TRACK

POUNDS PER SQ. INCH ABOVE ATMOSPHERE			FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
KIND										
180	Anthracite Coal	1343	160.9	—	1503.9	38.5	1.435	4'-8 $\frac{1}{2}$ "		

FOR HAULING CAPACITY SEE PAGE 290.



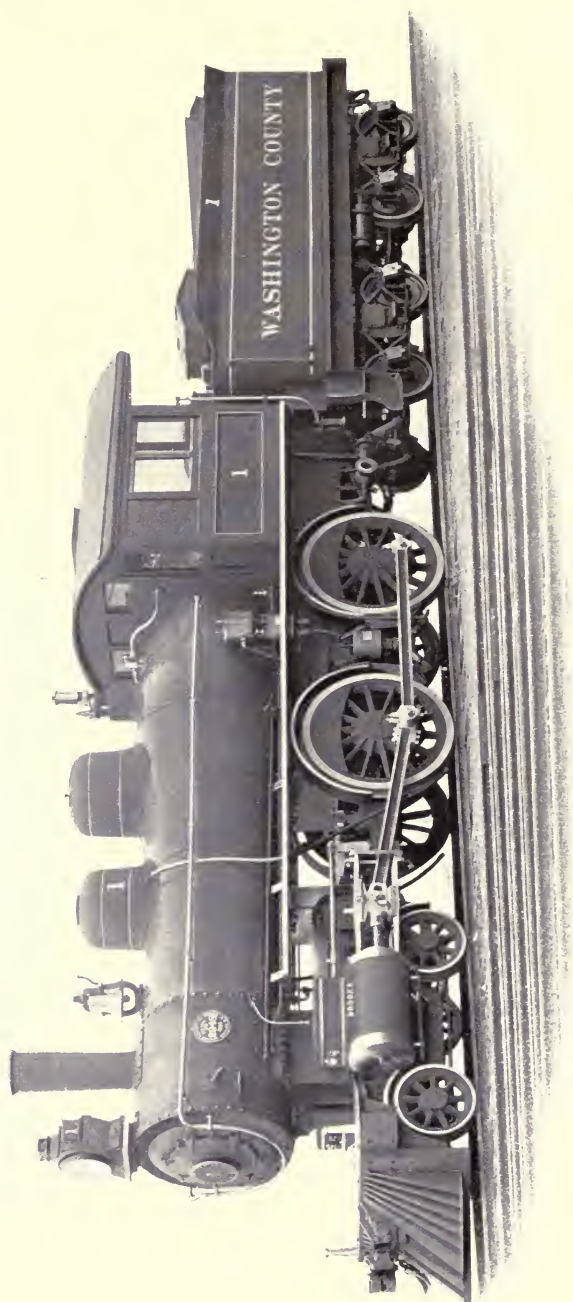
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1898
FOR THE PECOS VALLEY & NORTHEASTERN RAILWAY.

CODE WORD, QUARTAN. SERIES, 664.
TYPE, 8-WHEELED PASSENGER. CLASS, 18 A.
WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS					WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.		
Simple	18"	24"	8	33"	—	—	4	62"	4	30"	Rad. Stay, Wagon Top	103" 33"
FLUES					WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
225	2"	11'-7 $\frac{1}{8}$ "	8'-0"	8'-0"	22'-8"	48'-11 $\frac{3}{8}$ "	84000	—	72000	37000	109000	
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL		SQUARE FEET	METRES	FEET	INCHES
180			Bituminous Coal	1355	140	—	1495		23.1	1.435	4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1898

FOR THE WASHINGTON COUNTY RAILROAD.

CODE WORD, QUARTIC.

TYPE, 8-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

SERIES, 647.

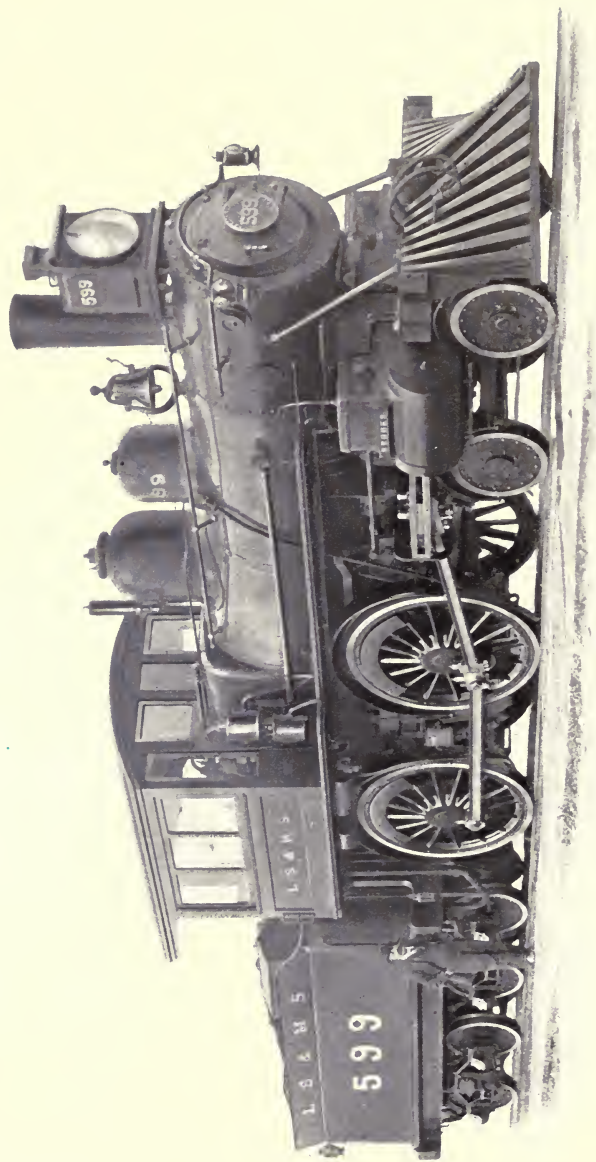
CLASS, 18 A.

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX											
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		LENGTH	WIDTH								
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.												
Simple		18"	24"	8	33"	—	—	4	62"	4	30"	Rad. Stay, Wagon Top		56"	97"	33"							
				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS															
FLUES				RIGID		ENGINE		ENGINE AND TENDER		TENDER		TRAILING WHEELS		DRIVERS		LEADING WHEELS		TOTAL ENGINE					
225		2"		11'-7 $\frac{1}{8}$ "		8'-0"		8'-0"		22'-8"		48'-11"		85000		—		70800		36200		107000	
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK											
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES		FIRE BOX		ARCH PIPES		TOTAL		SQUARE FEET		METRES		FEET		INCHES			
180				Bituminous Coal		1356		134		—		1490		21.8		1.435		4'-8 $\frac{1}{2}$ "					

FOR HAULING CAPACITY SEE PAGE 290.





The locomotive described above was used by the Lake Shore & Michigan Southern Railway Co. during the Chicago Exposition in regular daily service on the "Exposition Flyer" or twenty-hour train between New York and Chicago, a distance of 980 miles. Near Elkhart, Ind., this engine attained a speed of 10.2 miles in less than six minutes, or at the rate of over 102 miles per hour.

"THE EXPOSITION FLYER."

BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1893

FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CODE WORD, QUARTO.

TYPE, 8-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

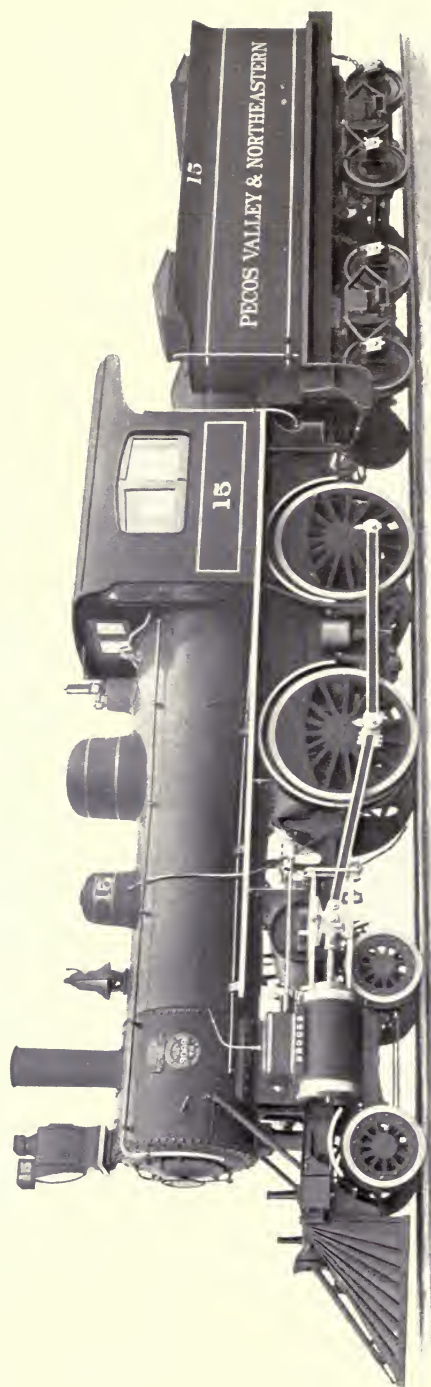
SERIES, 472.

CLASS, 17 A.

TANK CAPACITY 3100 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH WIDTH
Simple	17"	24"	8	33"	—	4	72"	4	33"	Improved Belpaire	78" 34"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
202	2"	12'-0"	9'-0"	9'-0"	23'-9"	45'-8"	70000	—	65100	39500	104600
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180	Bituminous Coal			1258	140	—	1398	18.4	1.435	4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1898

FOR THE PECOS VALLEY & NORTHEASTERN RAILWAY.

CODE WORD, QUATRAIN.

TYPE, 8-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

SERIES, 680.

CLASS, 17 A.

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS

WHEELS

BOILER

FIRE BOX

TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	17"	24"	8	33"	—	—	4	62"	4	30"	Rad. Stay, Wagon Top	52"	Long, Sloping	96"	33"

FLUES

WHEEL BASE

AVERAGE WEIGHT IN WORKING ORDER, POUNDS

NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
196	2"	11'-1"	8'-0"	8'-0"	22'-1½"	44'-0"	86000	—	64000	32000	96000

BOILER PRESSURE

FUEL

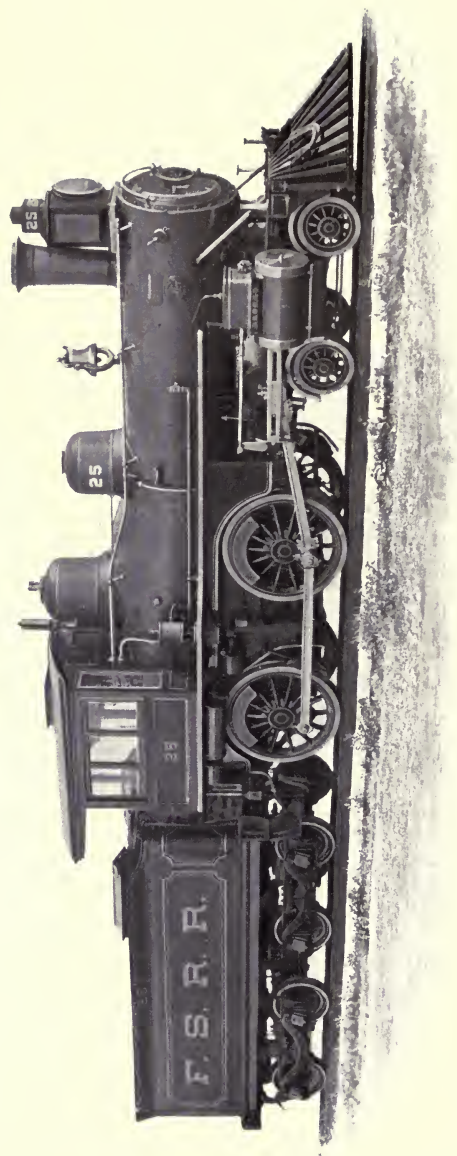
HEATING SURFACE, SQ. FT.

GRATE AREA

GAUGE OF TRACK

POUNDS PER SQ. INCH ABOVE ATMOSPHERE		KIND	FLUES	FIRE BOX	ARCH TILES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180		Bituminous Coal	1129	115	—	1244	22	1.435	4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1894

FOR THE FLORIDA SOUTHERN RAILWAY.

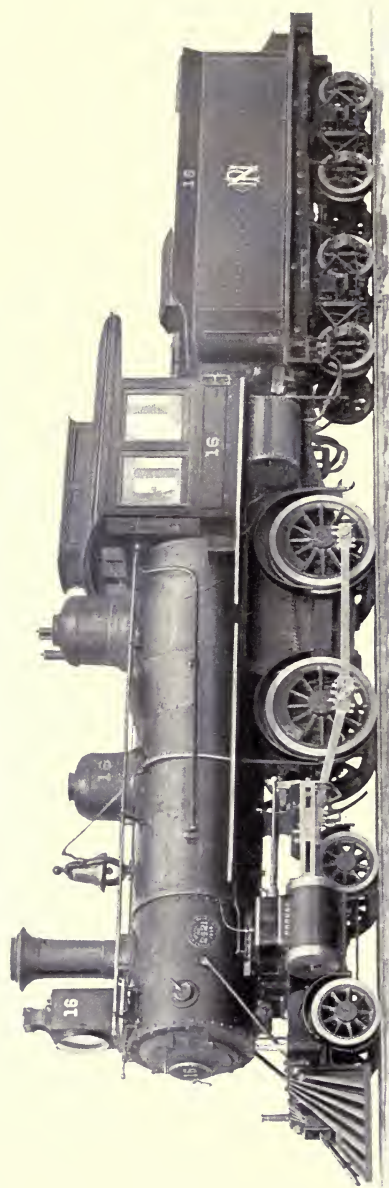
CODE WORD, QUAVER.
 TYPE, 8-WHEELED PASSENGER.
 WITH 8-WHEELED TENDER

SERIES, 525.
 CLASS 17 A.

TANK CAPACITY 3500 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH		
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple		17"	24"	8	33"	—	—	4	62"	4	28"	Crown Bar, Wagon Top	52"	72"	35"		
AVERAGE WEIGHT IN WORKING ORDER, POUNDS																	
FLUES				WHEEL BASE				TENDER				DRIVERS		LEADING WHEELS		TOTAL ENGINE	
186	2"	10'-11"	8'-6"	8'-6"	22'-6"	44'-9"	67000	—		58600		35000		93600			
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH TILES	TOTAL		SQUARE FEET		METRES		FEET INCHES			
160				Wood	1055.7	1110.7	—		1166		17		1.435		4'-8½"		

FOR HAULING CAPACITY SEE PAGE 290.



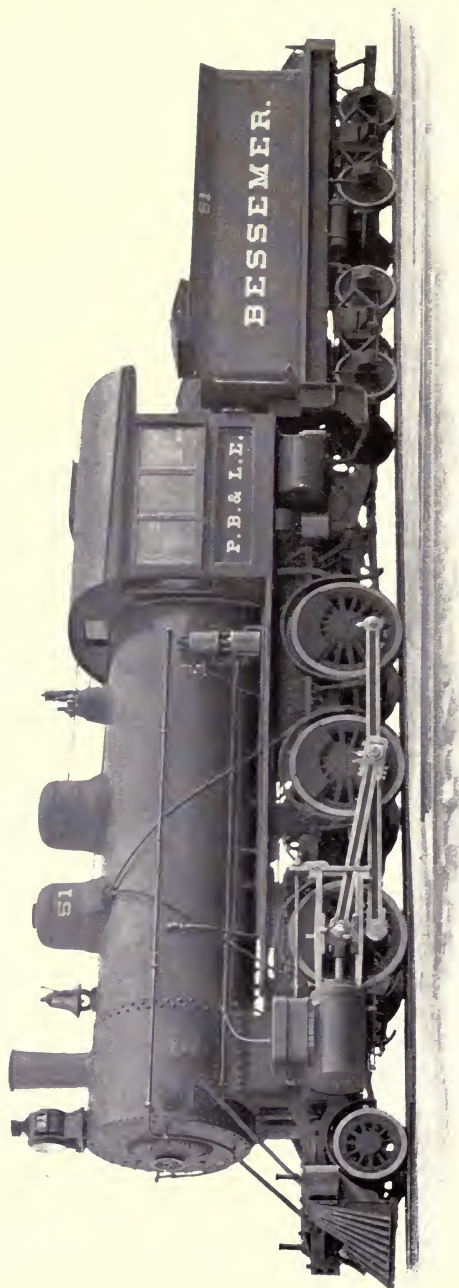
BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1894
 FOR THE NORTH PACIFIC COAST RAILROAD,

CODE WORD, QUAY. SERIES, 523.
 TYPE, 8-WHEELED PASSENGER. CLASS, 15 A.
 WITH 8-WHEELED TENDER TANK CAPACITY 2200 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX						
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple		15"	20"	8	28"	—	—	4	48"	4	28"	Crown Bar, 50 $\frac{1}{4}$ " Wagon Top		Long, Wide Sloping	84"	24"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
164	2"	9'-0"	7'-0"	7'-0"	18'-5"	40'-10"	64000	—	48000	20000	68000					
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
165				Bituminous Coal	772	83	—	855	13.6	.914	3'-0"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1897

FOR THE PITTSBURG, BESEMER & LAKE ERIE RAILROAD.

CODE WORD, QUEACH.
TYPE, MOGUL FREIGHT.

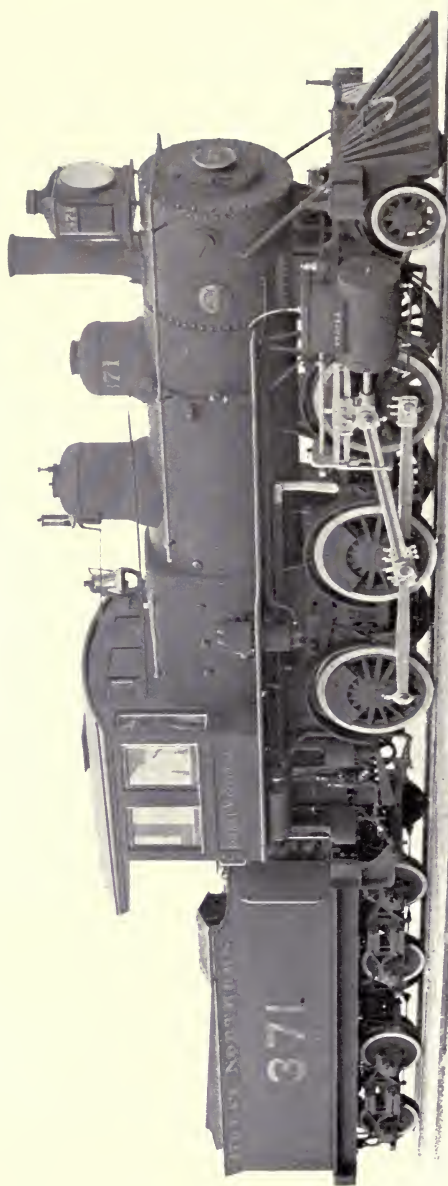
SERIES, 607.
CLASS, 20 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS			WHEELS						BOILER		FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	20"	26"	8	33"	—	—	6	56"	2	33"	Rad. Stay, Straight Top	72"	Long, Wide	108"	37 ³ / ₄ "
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
300	2"	12'-0 ³ / ₈ "	14'-0"	14'-0"	22'-5"	52'-4"	85000	—	145400	22450	167850				
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX		ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
180			Bituminous Coal	1871	186		—	2057	28.4	1.435	4'-8 ¹ / ₂ "				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1896

FOR THE GREAT NORTHERN RAILWAY.

CODE WORD, QUEAN.

TYPE, MOGUL FREIGHT.

SERIES, 587.

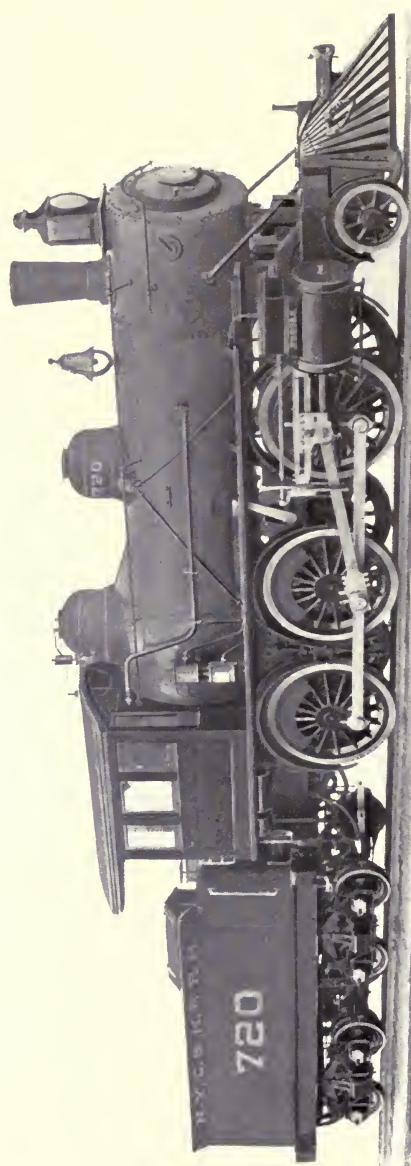
CLASS, 19 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX							
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
NO.	DIA.	19"	26"	NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple				19"	26"	8	33"	—	6	55"	2	30"	Improved Belpaire	63"	Long, Sloping	98"	32"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
250	2"	11'-1 ¹ / ₈ "	14'-0"	14'-0"	21'-6"	48'-4"	85000	—	114000	16000	130000						
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
180				Bituminous Coal	1450	151	—	1601	21.1	1.435	4'-8 ¹ / ₂ "						

FOR HAULING CAPACITY SEE PAGE 290.





BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1895
FOR THE MISSOURI, KANSAS & TEXAS RAILWAY.

CODE WORD, QUECK.

TYPE, MOGUL FREIGHT.

SERIES, 546.

CLASS, 19 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 4000 U. S. GALLONS AND 8 TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING	COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH
			NO.	DIA.		NO.	DIA.	NO.	DIA.				
Simple	19"	24"	8	33"	—	—	56"	2	30"	Crown Bar, Straight Top	60"	Long	96 ⁷ / ₁₆ " 34 ³ / ₈ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS					
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE		
												FEET	INCHES
228	2"	11'-6"	12'-8"	12'-8"	20'-11 ¹ / ₂ "	44'-11 ³ / ₄ "	85000	—	105000	16000	121000		
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES		FIRE BOX	TOTAL		SQUARE FEET		METRES	
								ARCH	PIPES				
170				Bituminous Coal	1357.77	134.5	—	1492.27	22.6	1.435	4'-8 ¹ / ₂ "		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1898
 FOR THE FLINT & PERE MARQUETTE RAILROAD.

CODE WORD, QUELQUE.
 TYPE, MOGUL FREIGHT.

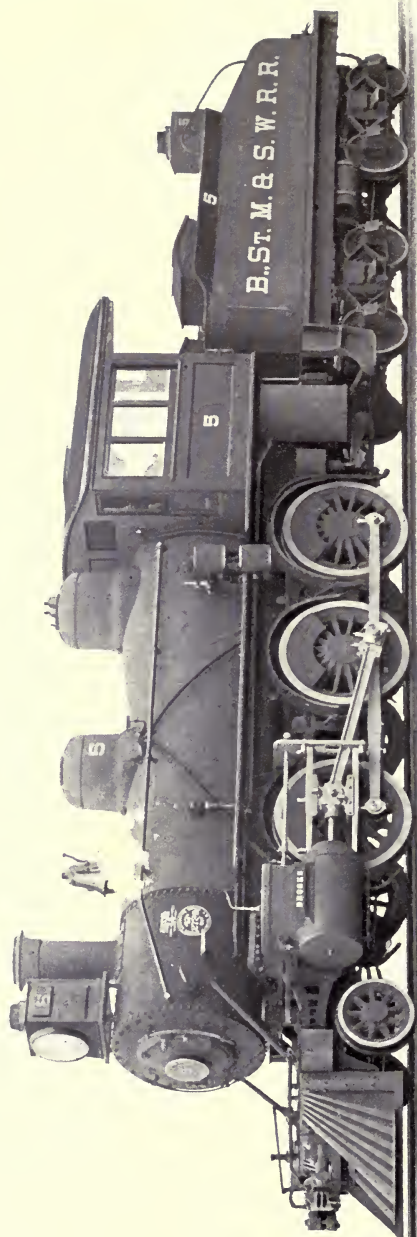
SERIES, 679.
 CLASS, 18 B.

TANK CAPACITY 4500 U. S. GALLONS AND 12½ TONS FUEL.

WITH 8-WHEELED TENDER

CYLINDERS				WHEELS				BOILER				FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple Piston Valve		18"	30"	8	33"	—	—	6	56"	2	30"	Improved Belpaire	62"	Long, Sloping	108"	42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
272	2"	12'-11"	15'-0"	15'-0"	23'-5"	51'-6"	90000	—	120000	17000	137000					
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX		ARCH	TYPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
180	Bituminous Coal				1708	157	21	1886	30.8	1.435	4'-8½"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1897

FOR THE BUFFALO, ST. MARY'S & SOUTHWESTERN RAILROAD.

CODE WORD, QUEME.

SERIES, 597.

TYPE, MOGUL FREIGHT.

CLASS, 18 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 3100 U. S. GALLONS AND 4 TONS FUEL

CYLINDERS				WHEELS						BOILER		FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	NE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
250	2"	11'-11 $\frac{1}{4}$ "	13'-0"	13'-0"	20'-6"	47'-2"	72000	—	108000	16000	124000	Long, Sloping	60"	Crown Bar, Wagon Top	102"	33"
AVERAGE WEIGHT IN WORKING ORDER, POUNDS																
FLUES			WHEEL BASE			AVERAGE WEIGHT IN WORKING ORDER, POUNDS										
BOILER PRESSURE			FUEL			HEATING SURFACE, SQ. FT.						GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND			FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
180	Bituminous Coal			1455	168	—	1623	23.3	1.435	4'-8 $\frac{1}{2}$ "						

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1895

FOR THE DULUTH, MISSISSIPPI RIVER & NORTHERN RAILROAD,

CODE WORD, QUENCH.

SERIES, 547.

TYPE, MOGUL FREIGHT.

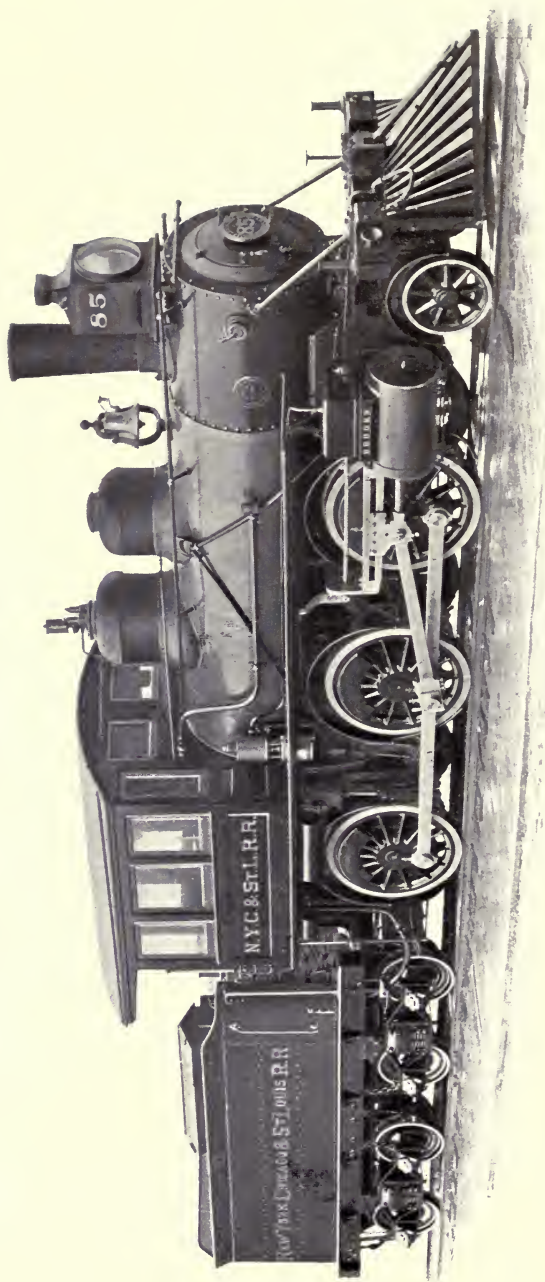
CLASS, 18 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 3500 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX					
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	18"	24"	8	33"	—	—	6	51"	2	28"	Crown Bar, Wagon Top	56"	Long, Sloping	96"	34"
FLUES			WHEEL BASE					AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
212	2"	11'-1"	14'-0"	14'-0"	21'-6"	48'-0"	74000	—	96000	14500	110500				
BOILER PRESSURE			FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
180	Bituminous Coal				1214	133.5	—	1347.5	22.2	1.435	4'-8½"				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1889

FOR THE NEW YORK, CHICAGO & ST. LOUIS RAILROAD.

CODE WORD, QUENELLA.

TYPE, MOGUL FREIGHT.

WITH 8-WHEELED TENDER

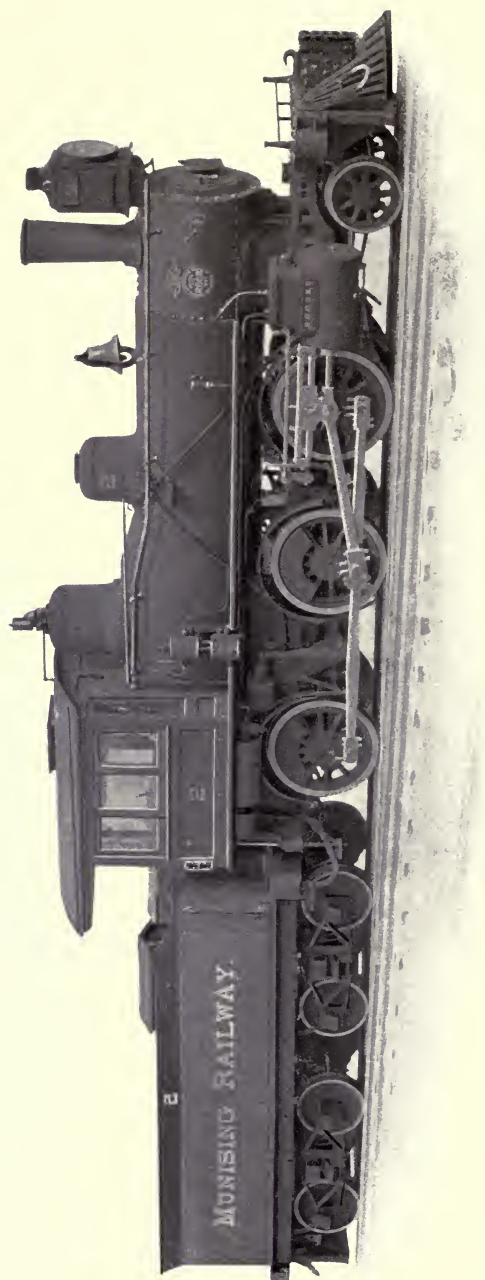
TANK CAPACITY 3000 U. S. GALLONS AND 6 TONS FUEL.

SERIES, 361.

CLASS, 18 B.

CYLINDERS			WHEELS						BOILER		FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	18"	24"	8	33"	—	—	6	56"	2	30"	Rad. Stay, Straight Top	56"	Long, Sloping	112"	34½"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
201	2"	11'-1½"	15'-0"	15'-0"	22'-6"	44'-5½"	60000	—	85000	15000	100000				
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
175			Bituminous Coal		1157	117	—	1274	26.25	1.435	4'-8½"				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1896
FOR THE MUNISING RAILWAY.

CODE WORD, QUERCITE.
TYPE, MOGUL FREIGHT.

SERIES, 579.
CLASS, 16 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 3000 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS

TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		BOILER		FIRE BOX	
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.	TYPE	DIA.	TYPE	LENGTH WIDTH
Simple	16"	24"	8	33"	—	—	6	50"	2	30"	Crown Bar, Wagon Top	50 $\frac{1}{4}$ "	Deep	66" 34 $\frac{1}{2}$ "

FLUES

WHEEL BASE

AVERAGE WEIGHT IN WORKING ORDER, POUNDS

NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
156	2"	10'-0"	13'-9"	13'-9"	21'-3"	43'-1"	65000	—	76000	14000	90000

BOILER PRESSURE

FUEL

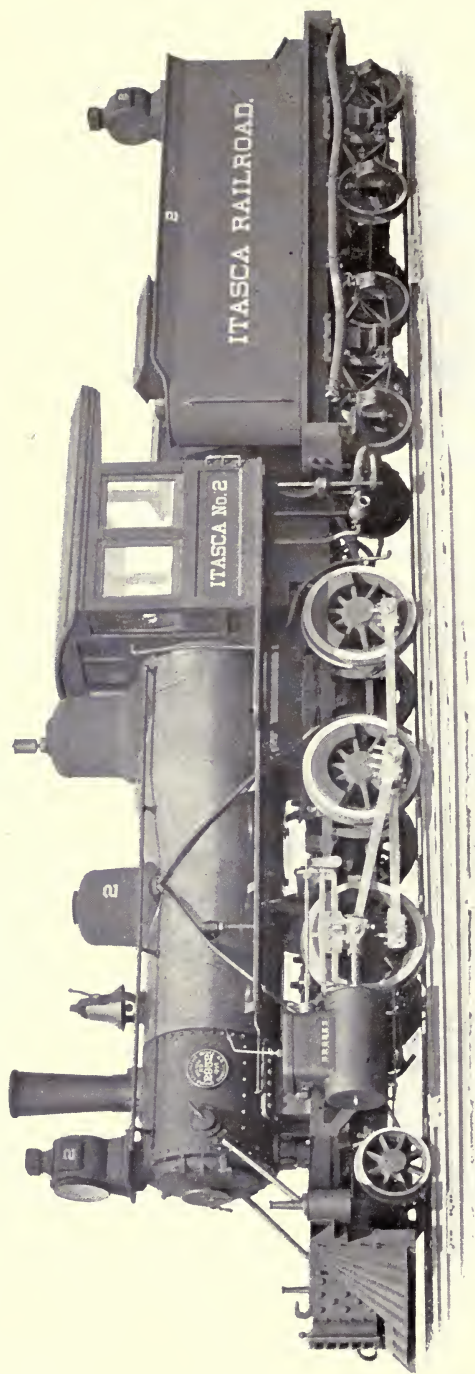
HEATING SURFACE, SQ. FT.

GRATE AREA

GAUGE OF TRACK

POUNDS PER SQ. INCH ABOVE ATMOSPHERE		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
165	Bituminous Coal	810.7	95	—	905.7	15.3	1.435	4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1898
FOR THE ITASCA RAILROAD.

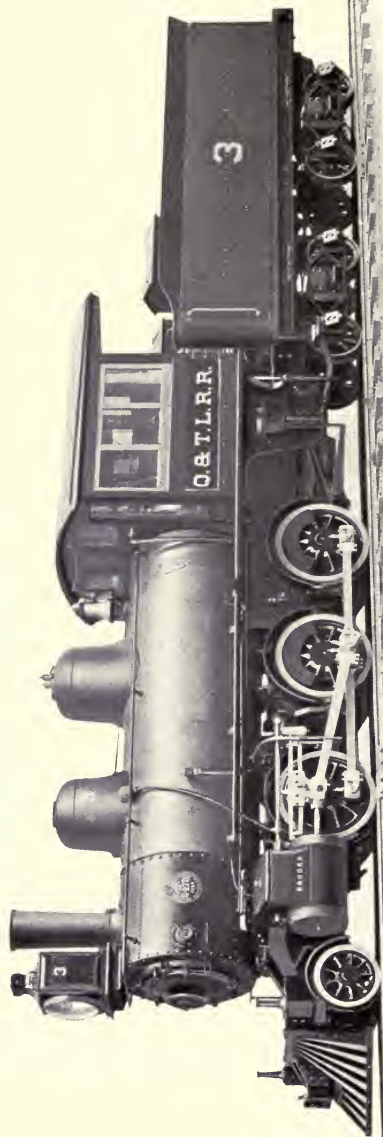
CODE WORD, QUERCUS.
TYPE, MOGUL FREIGHT.

SERIES, 651.
CLASS, 14 B.
TANK CAPACITY 3000 U. S. GALLONS AND 6 TONS FUEL.

WITH 8-WHEELED TENDER

CYLINDERS				WHEELS						BOILER		FIRE BOX		
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.			
Simple		14"	22"	8	30"	—	—	6	42"	2	24"	Crown Bar, Wagon Top	54"	33"
AVERAGE WEIGHT IN WORKING ORDER, POUNDS														
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
126	2"	9'-0"	11'-0"	11'-0"	17'-8"	40'-0½"	63000	—	56000	10500	66500			
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.				GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES	
150				Bituminous Coal		589	75	—	664	12.1	1.435	4'-8½"		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1894

FOR THE QUINCY & TORCH LAKE RAILROAD.

CODE WORD, QUERENT.
 TYPE, MOGUL FREIGHT.

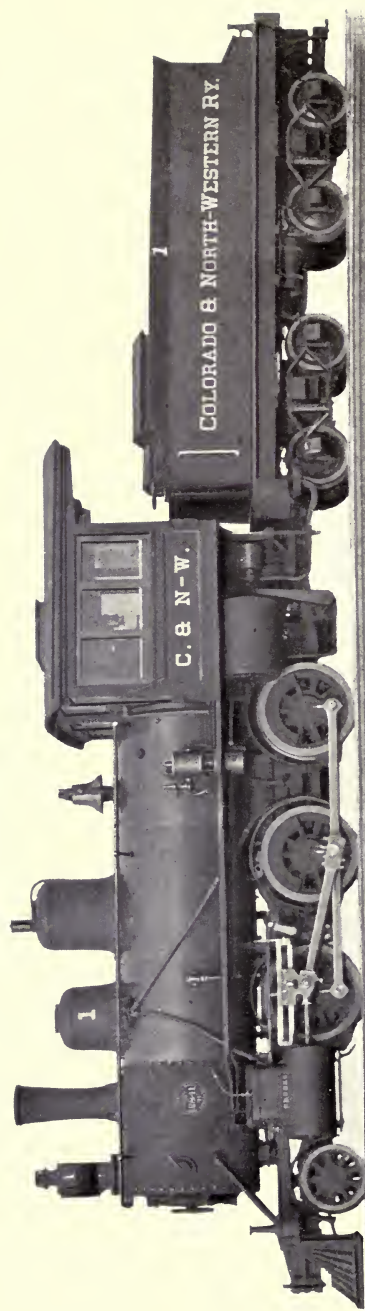
SERIES, 537.
 CLASS, 17 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 3100 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
200	2"	10'-1 $\frac{1}{8}$ "	11'-0"	11'-0"	18'-0"	43'-6"	72000	—	79000	11000	90000				
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES	FEET	INCHES	
160				Bituminous Coal		1050	114	—	1164	17.5		.914	3'-0"		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1897

FOR THE COLORADO & NORTH-WESTERN RAILWAY.

CODE WORD, QUERIST.
TYPE, MOGUL FREIGHT.

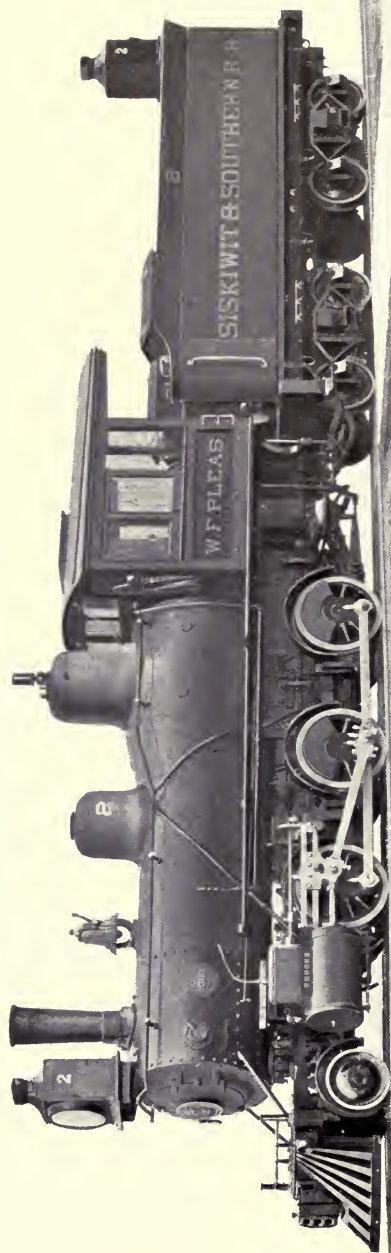
SERIES, 624.
CLASS, 15 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 2000 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple			15"	22"	8	28"	—	—	6	42"	2	28"	Rad. Stay, Straight Top	54"	Long, Wide	84"	24"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
170	2"	8'-2 $\frac{1}{8}$ "	10'-4"	10'-4"	16'-10"	41'-1"	52000	—	61000	9000	70000						
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
165				Bituminous Coal		720	88	—	808	13.5	.914	3'-0"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1895
FOR THE SISKIWIIT & SOUTHERN RAILROAD.

CODE WORD, QUERKIN.
TYPE, MOGUL FREIGHT.

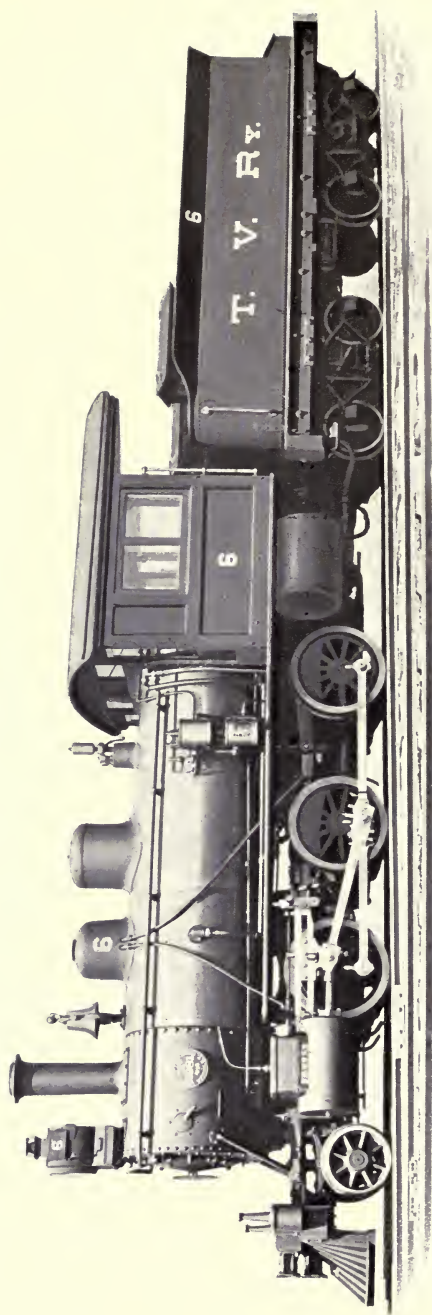
SERIES, 562.
CLASS, 15 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 2700 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX		
TYPE	DIA.	STROKE	TENDER NO.	DIA.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	DIA.	TYPE	LENGTH INCHES
Simple	15"	20"	8	28"	—	—	6	36"	2	24"	Crown Bar, Wagon Top	50"	Long, Wide over Frames	84" 24"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
164	2"	8'-2"	10'-4"	10'-4"	16'-10"	41'-4"	56000	—	58000	10000	68000			
BOILER PRESSURE			FUEL			HEATING SURFACE, Sq. Ft.			GRATE AREA			GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL				SQUARE FEET	METRES	FEET	INCHES
150	Bituminous Coal		695	85.5	—	780.5	.914	3'-0"						

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE TIONESTA VALLEY RAILWAY.

CODE WORD, QUERLE.
 TYPE, MOGUL FREIGHT.

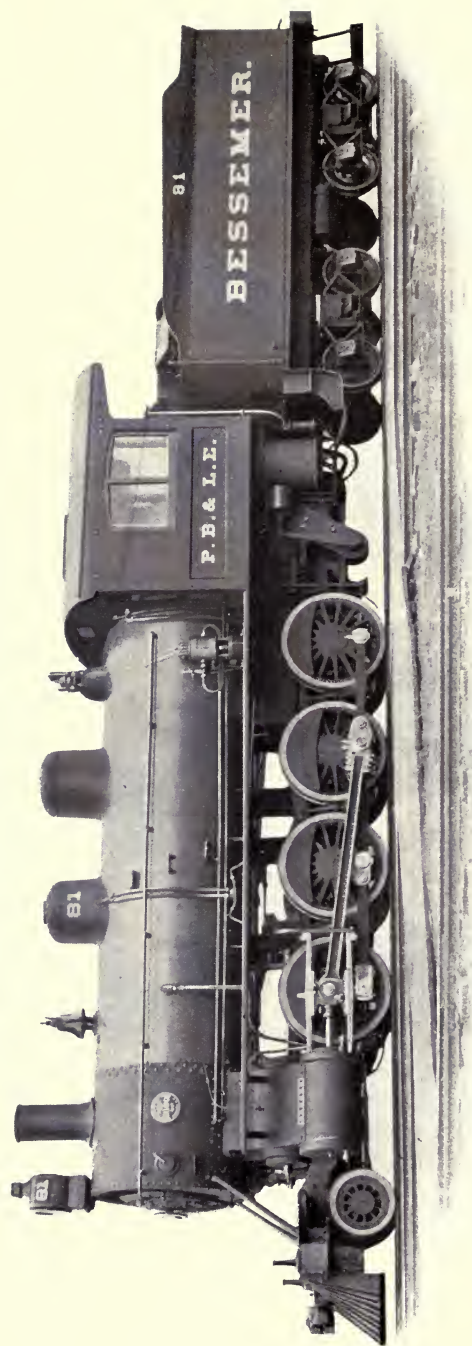
SERIES, 661.
 CLASS, 15 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 2000 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS			WHEELS						BOILER			FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple	15"	18"	8	26"	—	—	6	38"	2	24"	Rad. Stay, Straight Top	52"	Long, Wide over Frames	78"	24"	
FLUES			WHEEL BASE						AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
150	2"	7'-5½"	10'-0"	10'-0"	15'-9"	39'-5½"	50000	—	51000	7000	58000					
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.							GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
165			Bituminous Coal		579	79	—	658	12.5	.914	3'-0"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1899

FOR THE PITTSBURGH, BESSEMER & LAKE ERIE RAILROAD.

CODE WORD, QUERPO.

TYPE, CONSOLIDATION FREIGHT.

WITH 8-WHEELED TENDER

SERIES, 685.

CLASS, 22 C.

TANK CAPACITY 5000 U. S. GALLONS AND 12½ TONS FUEL.

CYLINDERS

TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		BOILER		FIRE BOX	
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.	TYPE	DIA.	TYPE	LENGTH WIDTH
Simple Piston Valve	22"	28"	8	33"	—	—	8	54"	2	30"	Rad. Stay, Straight Top	72"	Long, Wide over Frames	114" 42"

FLUES

WHEEL BASE

AVERAGE WEIGHT IN WORKING ORDER, POUNDS

NO.	DIA.	LENGTH	DRAING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
242	21"	14'-9½"	15'-4"	15'-4"	23'-9"	54'-0"	107000	—	159000	20000	179000

BOILER PRESSURE

FUEL

HEATING SURFACE, Sq. Ft.

GRATE AREA

GAUGE OF TRACK

POUNDS PER SQ. INCH
ABOVE ATMOSPHERE

KIND

FLUES

ARCH PIPES

TOTAL

SQUARE FEET

METRES

FEET INCHES

180

Bituminous Coal

2091

192

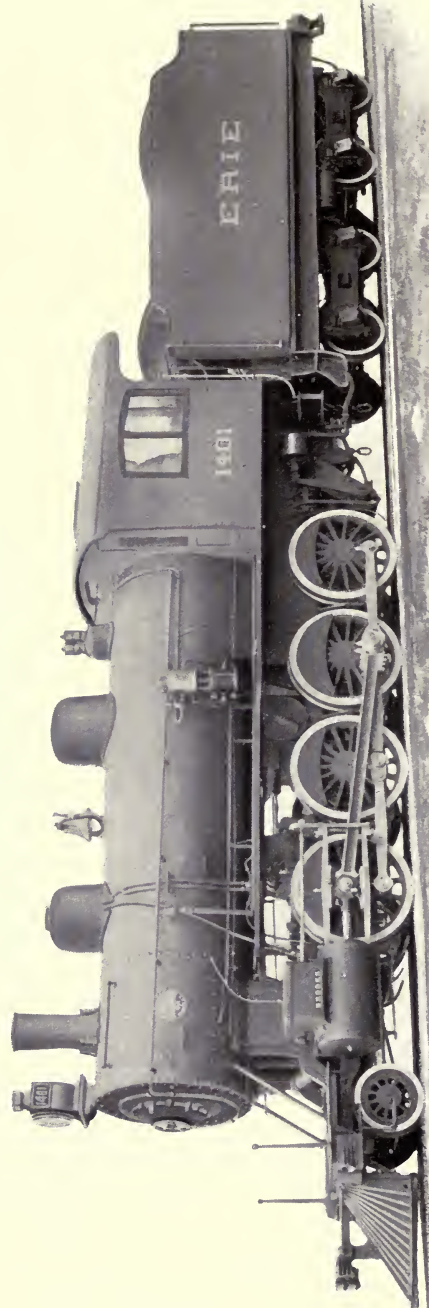
2283

32.4

1.435

4'-8½"

FOR HAULING CAPACITY SEE PAGE 290.



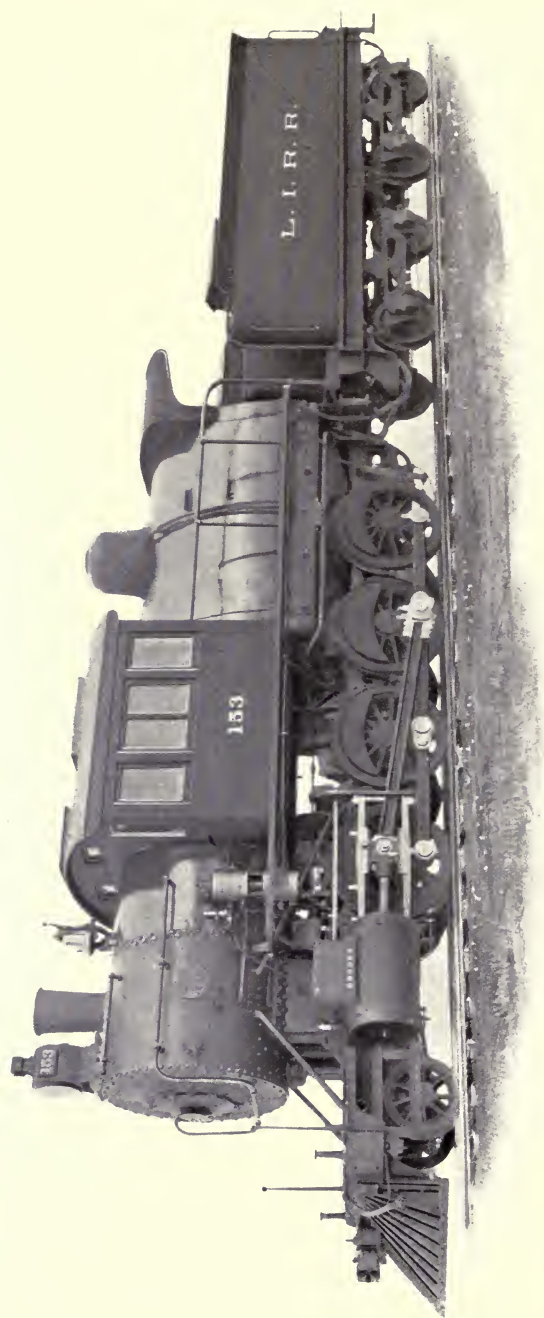
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1899
FOR THE ERIE RAILROAD,

CODE WORD, QUESAL. SERIES, 701.
TYPE, CONSOLIDATION FREIGHT. CLASS, 21 C.
WITH 8-WHEELED TENDER TANK CAPACITY 6000 U. S. GALLONS AND 15 TONS FUEL.

CYLINDERS				WHEELS						BOILER			FIRE BOX		
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple		21"	28"	8	36"	—	—	8	57"	2	30"	Rad. Stay, Wagon Top	68"	120"	42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
304	2"	13'-2 $\frac{3}{8}$ "	15'-9"	15'-9"	24'-0"	53'-6"	132000	—	150000	20000	170000				
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
200				Bituminous Coal		2082	193	—	2275	41.4	1.435	4'-8 $\frac{1}{2}$ "			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1898

FOR THE LONG ISLAND RAILROAD.

CODE WORD QUESQUE.

SERIES, 677.

TYPE, CONSOLIDATION FREIGHT.

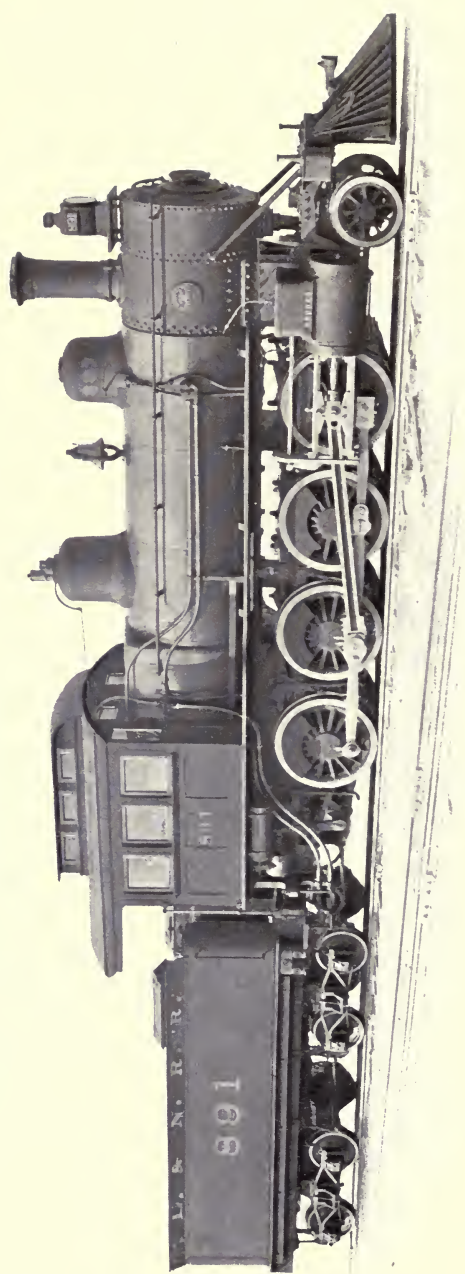
CLASS, 21 C.

WITH 8-WHEELED TENDER

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	21"	28"	8	30"	—	—	8	51"	2	30"	Rad. Stay, Straight Top	72"	Wide over Wheels	120"	84"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
294	2"	11' - 7 ³ / ₁₆ "	14' - 6"	14' - 6"	22' - 9"	50' - 2"	86000	—	135000	20000	155000				
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
180	Anthracite Coal				1773	172	—	1945	69.5	1.435	4' - 8 ¹ / ₂ "				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U. S. A.

1898
FOR THE LOUISVILLE & NASHVILLE RAILROAD.

CODE WORD, QUESTANT.
TYPE, CONSOLIDATION FREIGHT.

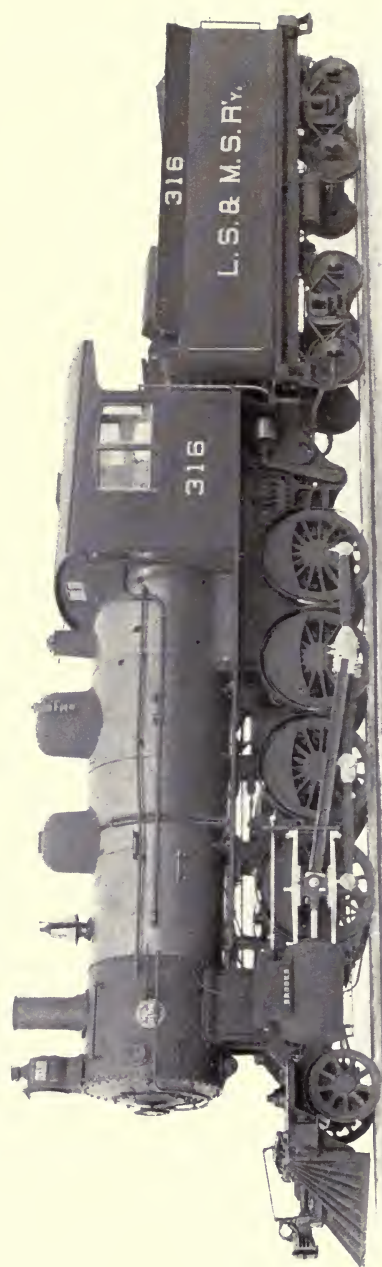
SERIES, 668.
CLASS, 21 C.

WITH 8-WHEELED TENDER

TANK CAPACITY 4200 U. S. GALLONS AND 12½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH	
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple			21"	26"	8	33"	—	—	8	55"	2	33"	Improved Belpaire	123 ¹ / ₂ "	34"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
222	21 ¹ / ₄ "	14'-0"	15'-11"	15'-11"	23'-8"	51'-11"	94000	—	139000	17000	156000				
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.		GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES		FEET INCHES			
170	Bituminous Coal				1820	185	—	2005	29.8	1.435		4'-8 ¹ / ₂ "			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1899

FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CODE WORD, QUESTMAN.

TYPE, CONSOLIDATION FREIGHT.

WITH 8-WHEELED TENDER

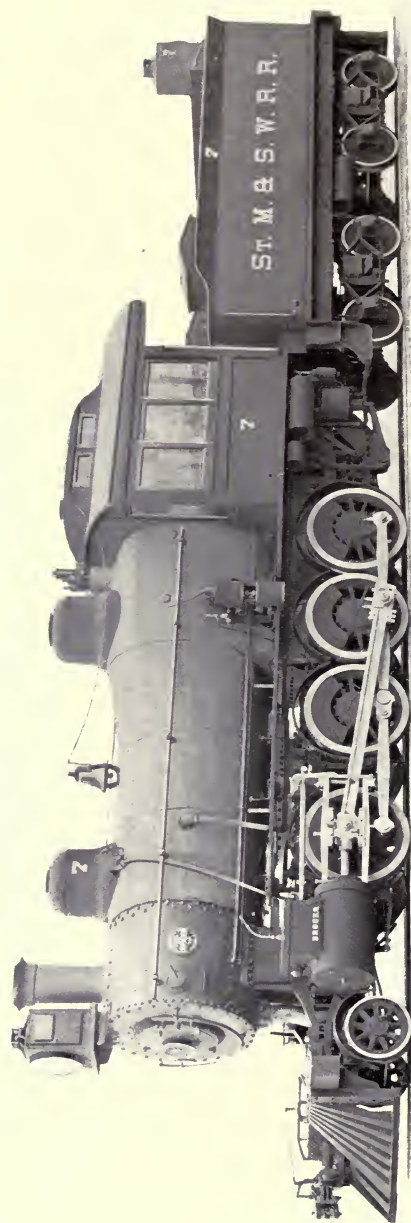
TANK CAPACITY 5000 U. S. GALLONS AND 12½ TONS FUEL.

SERIES, 683.

CLASS, 20½ C.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO. DIA.	TRAILING NO. DIA.	COUPLED DRIVERS NO. DIA.	LEADING NO. DIA.	TYPE		DIA.	TYPE	LENGTH WIDTH
Simple	20½"	28"	8 33"	— —	8 56"	2 33"	Rad. Stay, Wagon Top		64½"	Long, Wide over Frames	114" 42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
286	2"	13'-3"	15'-3"	15'-3"	23'-3"	51'-6"	94000	—	138500	18000	156500
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180	Bituminous Coal			1971	188	24	2183	324	1.435	4'-8½"	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1896

FOR THE ST. MARY'S & SOUTHWESTERN RAILROAD.

CODE WORD, QUESTOR.
 TYPE, CONSOLIDATION FREIGHT.

SERIES, 575.
 CLASS, 20 C.

WITH 8-WHEELED TENDER

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.



CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING	COUPLED DRIVERS		LEADING		TYPE	LENGTH
			NO.	DIA.	NO.	DIA.	NO.	NO.	DIA.		WIDTH
Simple	20"	26"	8	33"	—	8	51"	2	30"	Crown Bar, Wagon Top	107 7/8"
										Long, Wide	37 1/8"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
308	2"	11'-1 5/16"	14'-8"	14'-8"	22'-8"	50'-4"	86000	—	142000	16750	158750
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180			Bituminous Coal	1765	196	—	1961	28.2	1.435	4'-8 1/2"	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1896
 FOR THE SOUTHERN RAILWAY.

CODE WORD, QUETTE.
 TYPE, CONSOLIDATION FREIGHT.

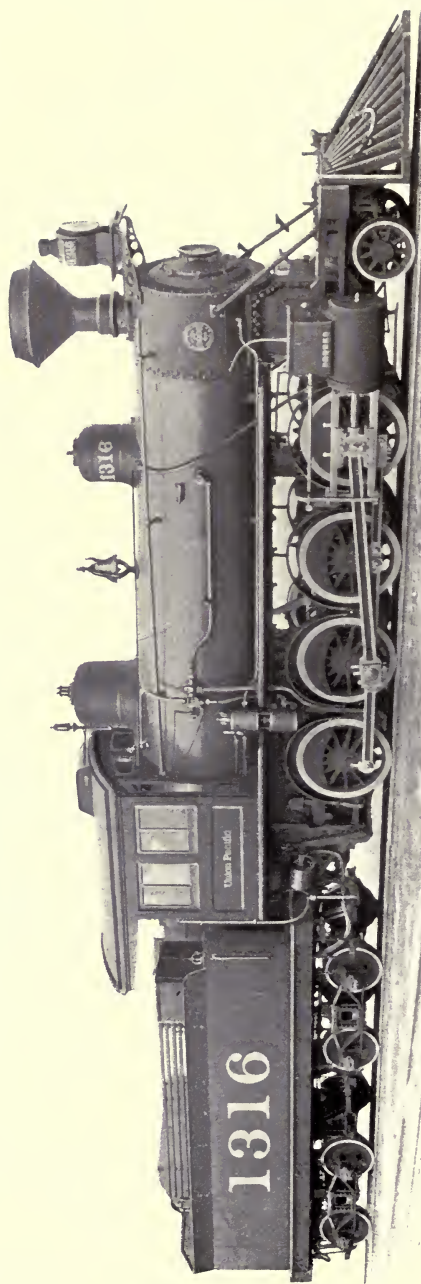
SERIES, 582.
 CLASS, 20 C.

WITH 8-WHEELED TENDER

TANK CAPACITY 4200 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX								
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		DIA.	TYPE	LENGTH	WIDTH				
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.								
Simple	20"	26"	8	33"	—	—	8	56"	2	30"	Rad. Stay, Wagon Top	60"	Long, Wide Sloping	102 ³ / ₄ " 41 ⁷ / ₈ "				
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS										
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE							
234	2"	13'-10"	15'-0"	15'-0"	22'-9 ¹ / ₂ "	49'-6"	86000	—	120100	20000	140100							
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.										
								GRATE AREA										
								GAUGE OF TRACK										
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND				FLUES		FIRE BOX		ARCH PIPES		TOTAL	SQ. FEET	METRES	FEET	INCHES
175	Bituminous Coal			1684	143	—	1827	30	1.448	4'-9"								

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1898

FOR THE UNION PACIFIC RAILWAY.

CODE WORD, QUEYOR.

TYPE, CONSOLIDATION FREIGHT.

WITH 8-WHEELED TENDER

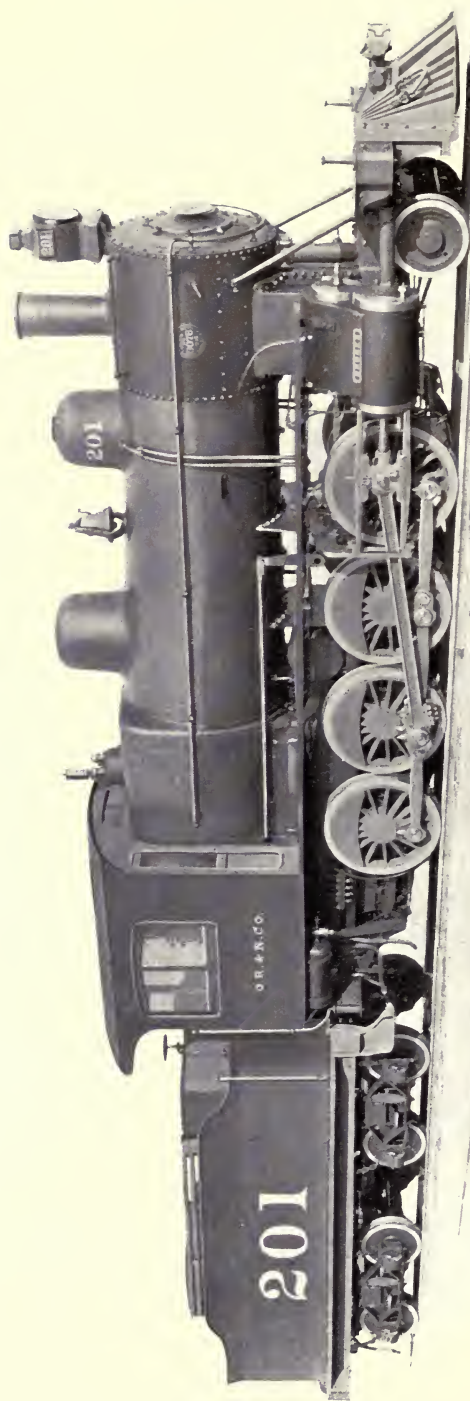
SERIES, 673.

CLASS, 20 C.

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH INCHES
Simple	20"	24"	8	33"	—	8	51"	2	28"	Crown Bar, Wagon Top	107½" 41½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
272	2"	13'-6"	15'-5"	15'-5"	23'-0"	52'-10½"	89000	—	131000	14000	145000
BOILER PRESSURE		FUEL	HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE.		KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES	FEET	INCHES
180		Bituminous Coal	1911	170	23	2104	30.3	1.435	4'-8½"		

FOR HAULING CAPACITY SEE PAGE 290.



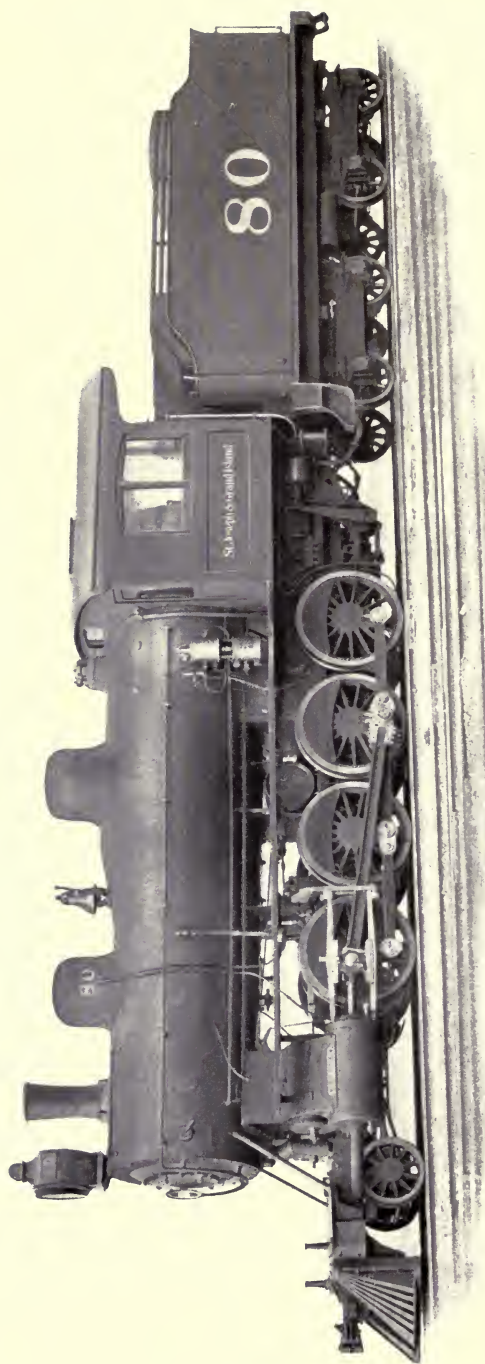
BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE OREGON RAILROAD & NAVIGATION COMPANY.

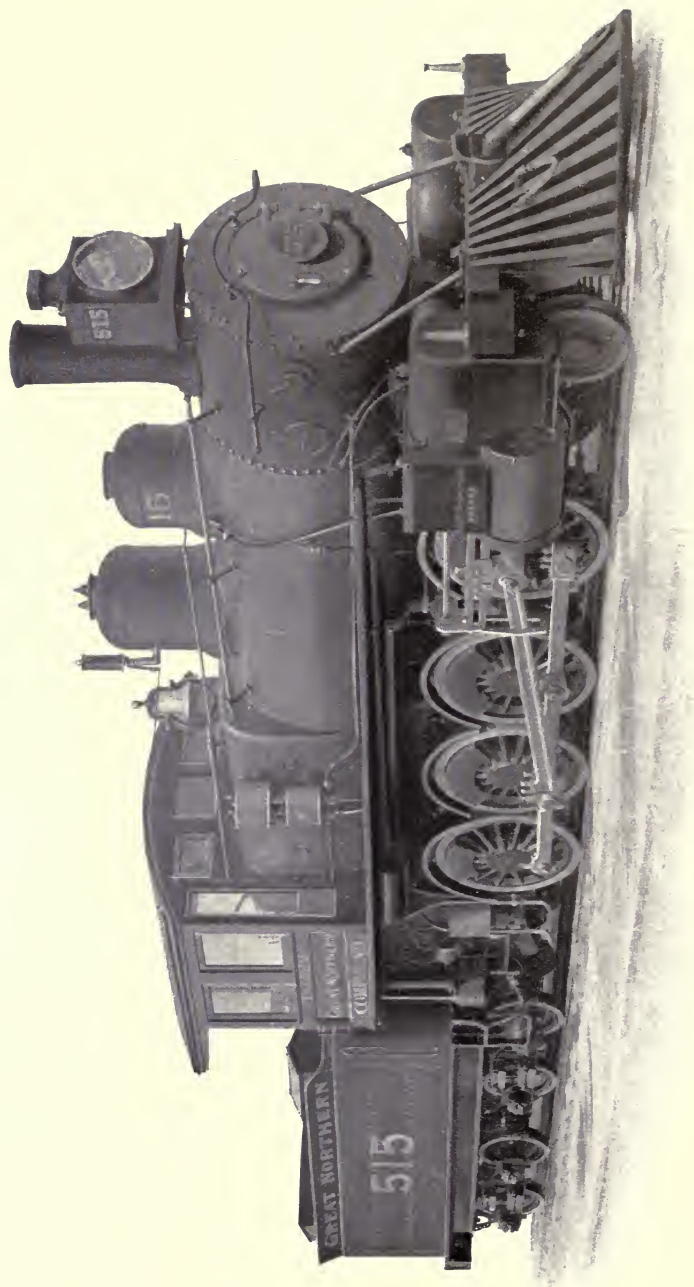
CODE WORD, QUIBBLE. SERIES, 674.
 TYPE, CONSOLIDATION FREIGHT. CLASS, 19 C.

WITH 8-WHEELED TENDER TANK CAPACITY 4500 U. S. GALLONS AND 12½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TENDER DIA.	TRAILING NO.	COUPLED DRIVERS NO.	LEADING NO.	DIA.	TYPE	DIA.	TYPE
Simple Piston Valve	19"	30"	8	33"	—	8	55"	2	30"	Improved Belpaire	64" Long, Wide
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
286	2"	13'-2½"	14'-6"	14'-6"	23'-2"	51'-8¾"	103000	—	136200	17800	154000
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.			
								GRATE AREA			
								GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH TUBES	TOTAL	SQUARE FEET	METRES	FEET
200	Bituminous Coal			1958	182	22	2162	32	1.435	4'-8½"	

FOR HAULING CAPACITY SEE PAGE 290.





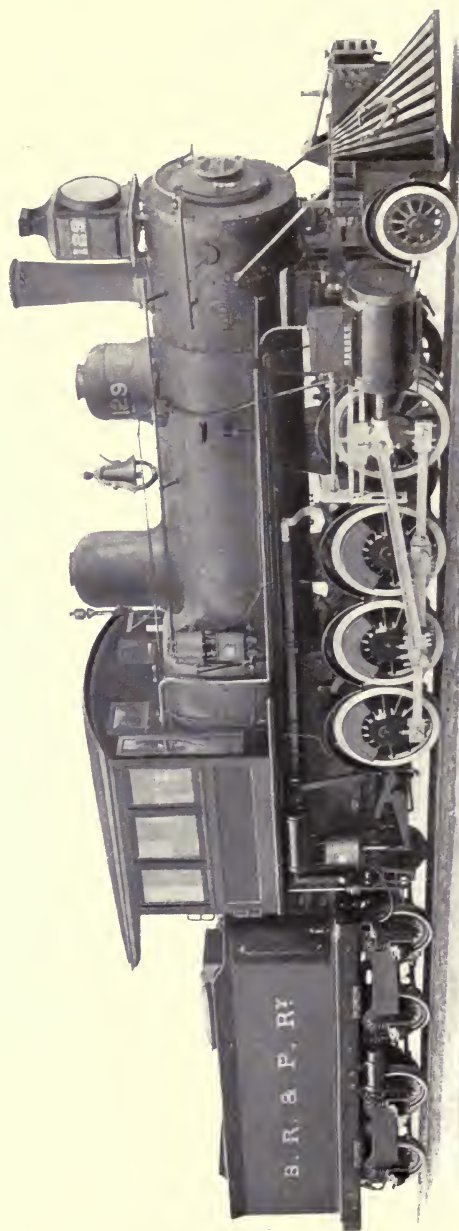
BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1893
 FOR THE GREAT NORTHERN RAILWAY.

CODE WORD, QUICKEN. SERIES, 482.
 TYPE, CONSOLIDATION FREIGHT. CLASS, B $\frac{1}{2}$ C.
 WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 8 TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	DIA.	TRAILING NO.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH	WIDTH
Tandem Compound	13" 22"	26"	8	33"	—	8	55"	2	30"	Improved Belpaire	63"	114" 32"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
208	2 $\frac{1}{2}$ "	11'-7"	15'-6"	15'-6"	23'-0"	50'-0"	85000	—	130000	17000	147000	
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.				
				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180	Bituminous Coal			1419	177	—	1596		25.3	1.435	4'-8 $\frac{1}{2}$ "	

POUNDS PER SQ. INCH
 ABOVE ATMOSPHERE

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

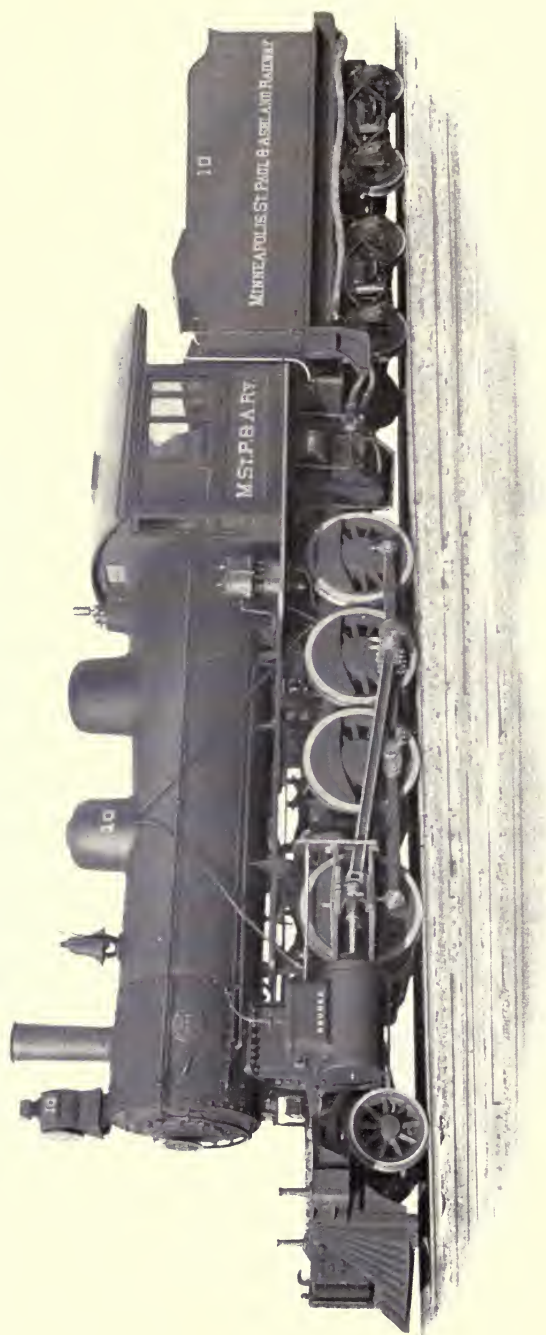
1894
FOR THE BUFFALO, ROCHESTER & PITTSBURG RAILWAY.

CODE WORD, QUICKSET. SERIES, 519.
TYPE, CONSOLIDATION FREIGHT. CLASS, 18 C.

WITH 8-WHEELED TENDER TANK CAPACITY 3900 U. S. GALLONS AND 6½ TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX										
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH								
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.											
Simple	18"	26"	8	33"	—	—	8	48"	2	30"	Improved Belpaire	108"	33"								
AVERAGE WEIGHT IN WORKING ORDER, POUNDS																					
FLUES				WHEEL BASE				TENDER		TRAILING WHEELS		TOTAL ENGINE									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER		DRIVERS		LEADING WHEELS		TOTAL ENGINE									
212	2"	13'-2"	13'-4"	13'-4"	20'-4"	20'-10"	47'-10"	78000	—		115000	13000	128000								
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK							
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES		FIRE BOX		ARCH PIPES		TOTAL		SQUARE FEET		METRES		FEET		INCHES	
180	Bituminous Coal			1452	158	15.7	1625.7	24	1.435	4'-8½"											

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

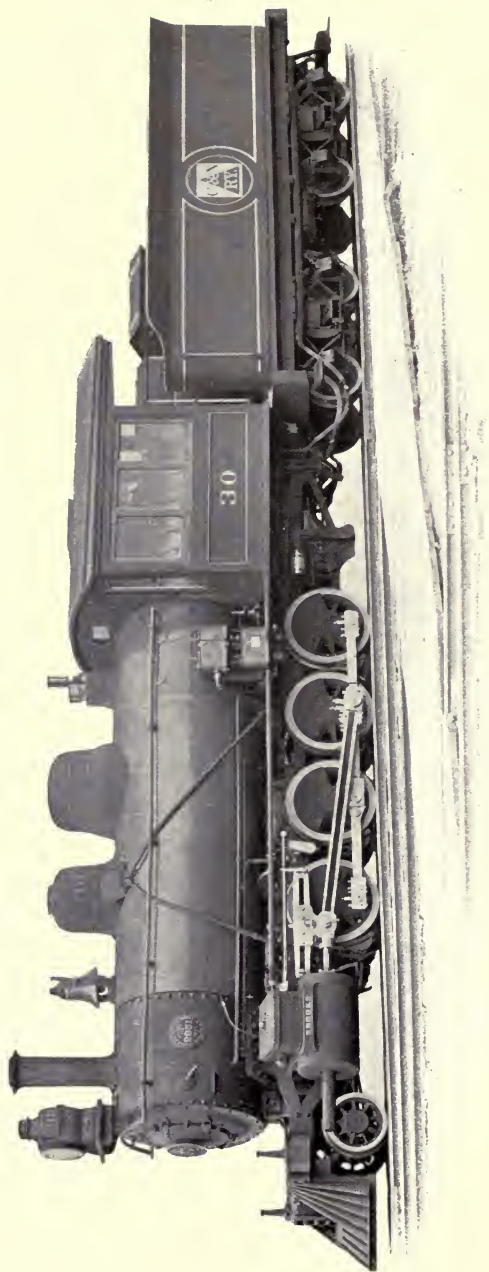
1899
 FOR THE MINNEAPOLIS, ST. PAUL & ASHLAND RAILWAY.

CODE WORD, QUICKSTEP. SERIES, 696.
 TYPE, CONSOLIDATION LOGGING. CLASS, 18 C.

WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 9½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX					
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	18"	26"	8	33"	—	—	8	50"	2	30"	Rad. Stay, Wagon Top	58"	Long, Sloping	107 ³ / ₁₆ "	32 ³ / ₈ "
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
230	2"	13'-10 ¹ / ₈ "	14'-6"	14'-6"	22'-1"	48'-1"	90000	—	118800	12000	130800				
BOILER PRESSURE			FUEL			HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES		FEET INCHES			
180	Bituminous Coal			1657	150	—	1807	24.3	1.435	4'-8 ¹ / ₂ "					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1898
 FOR THE COLORADO & NORTHWESTERN RAILWAY.

CODE WORD, QUIDAM. SERIES, 656.

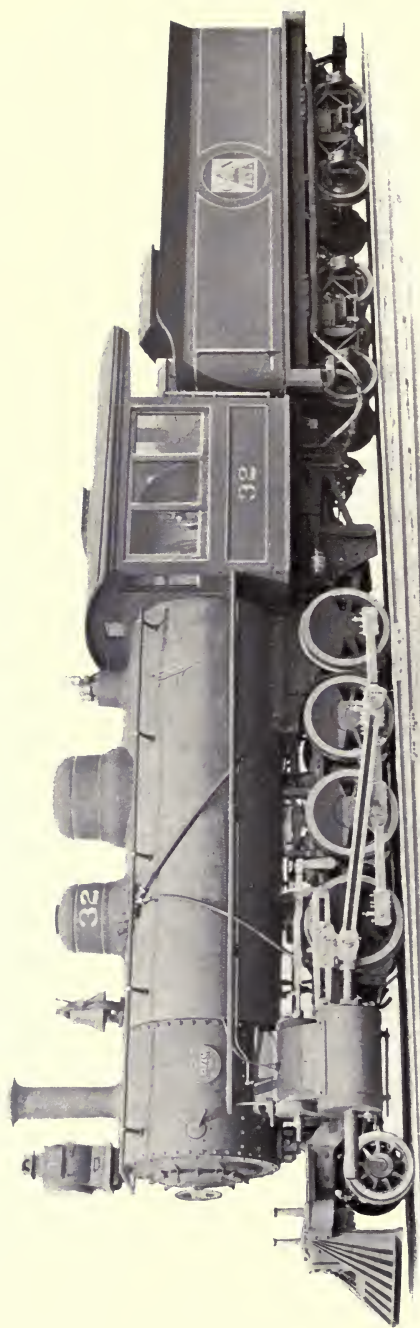
TYPE, CONSOLIDATION FREIGHT.

CLASS, 16 C.

WITH 8-WHEELED TENDER TANK CAPACITY 3100 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO. | DIA.	TRAILING NO. | DIA.	COUPLED DRIVERS NO. | DIA.	LEADING NO. | DIA.	TYPE		DIA.	TYPE	LENGTH | WIDTH
Simple Piston Valve	16"	20"	8 | 28"	— | —	8 | 37"	2 | 24"	Rad. Stay, Wagon Top		58"	Long, Wide	120" | 24"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
221	2"	10'-11 ¹ / ₈ "	10'-8"	10'-8"	18'-4"	43'-9"	67000	—	86000	8500	94500
BOILER PRESSURE			FUEL		HEATING SURFACE, SQ. FT.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET | INCHES
180			Bituminous Coal		1159	130	—	1289	19.3	0.9144	3'-0"

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1898

FOR THE COLORADO & NORTHWESTERN RAILWAY.

CODE WORD, QUIDDIT.

TYPE, CONSOLIDATION FREIGHT.

WITH 8-WHEELED TENDER

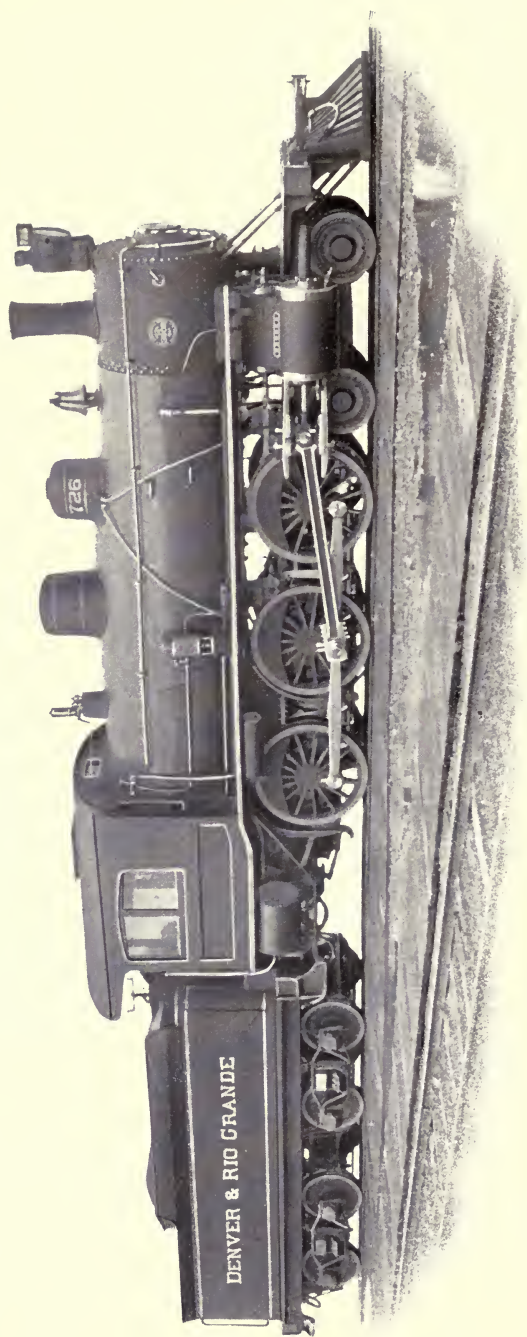
SERIES, 648.

CLASS, 16 C.

TANK CAPACITY 3100 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX							
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		DIA.	TYPE	LENGTH	WIDTH			
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.							
Simple	16"	20"	8	28"	—	—	8	37"	2	24"	Rad. Stay, Wagon Top	58"	Long, Wide	120"	24"		
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
221	2"	10'-1 $\frac{1}{8}$ "	10'-8"	10'-8"	18'-4"	43'-9"	67000	—	86000	9000	95000						
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA				GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
180	Bituminous Coal				1159	130	—	1289	19.3	0.9144	3'-0"						

FOR HAULING CAPACITY SEE PAGE 290.



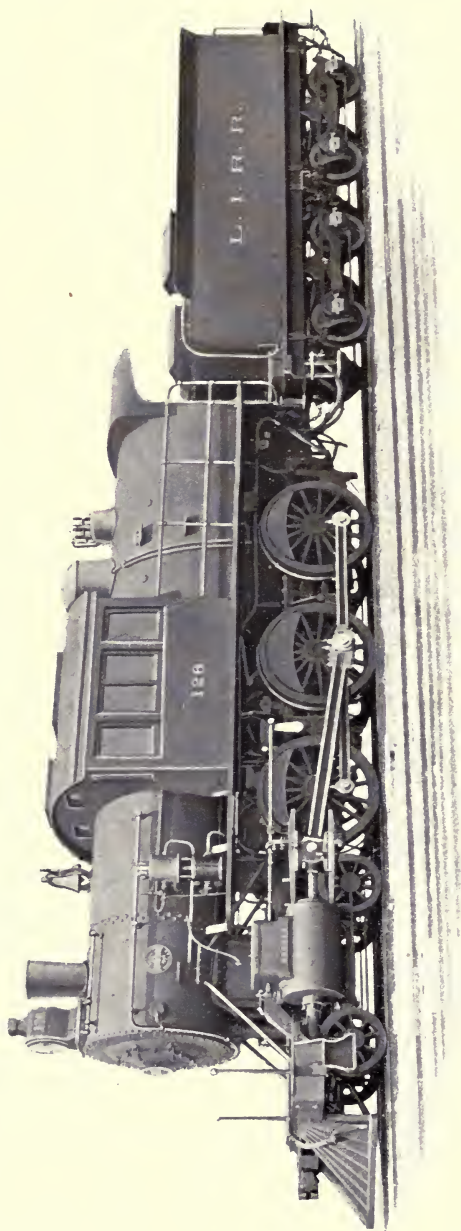
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1899
FOR THE DENVER & RIO GRANDE RAILROAD.

CODE WORD, QUIDDLE. SERIES, 698.
TYPE, 10-WHEELED PASSENGER. CLASS, 21 D.
WITH 8-WHEELED TENDER TANK CAPACITY 5500 U. S. GALLONS AND 10 TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.		WIDTH
Simple Piston Valve	21"	26"	8	38"	—	—	6	63"	4	33"	Rad. Stay, Wagon Top	121"
											Long, Wide Sloping	41"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
326	2"	13'-31 ³ / ₈ "	13'-0"	13'-0"	23'-7"	53'-10 ³ / ₄ "	115000	—	124000	36000	160000	
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.		GRATE AREA		GAUGE OF TRACK		
				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
210				Bituminous Coal	2257	165	—	2422	33.5	1.435	4'-8 ¹ / ₂ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U. S. A.

1899

FOR THE LONG ISLAND RAILROAD.

CODE WORD, QUIDNUNC.

TYPE, 10-WHEELED FREIGHT.

WITH 8-WHEELED TENDER

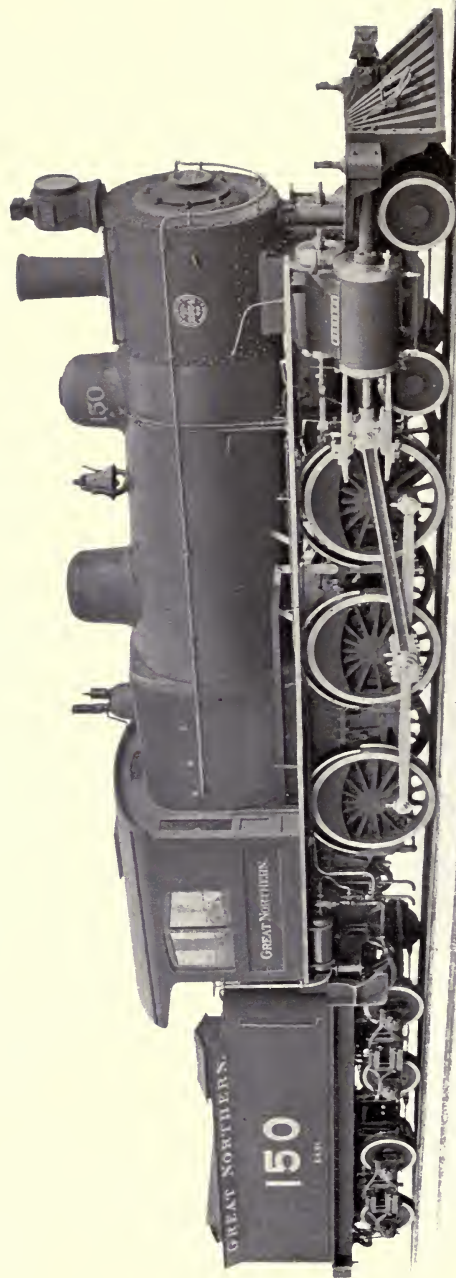
SERIES, 692.

CLASS, 21 D.

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX	
TYPE	DIA.	STROKE		TRAILING	COUPLED DRIVERS		LEADING	TYPE	DIA.	TYPE	LENGTH	WIDTH
		NO.	DIA.		NO.	DIA.	NO.					
Simple	21"	26"	8	33"	—	—	60½"	4	30"	Straight	66½"	Wide over Wheels
					6						120"	84"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
272	2"	13'-4 ³ / ₁₆ "	13'-0"	6'-6"	23'-5"	51'-1"	90000	—	115000	36000	151000	
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.				
								GRATE AREA				
								GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH TIPS	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180	Fine Anthracite Coal				1889	141	—	2030	69.5	1.435	4'-8½"	

FOR HAULING CAPACITY SEE PAGE 290.



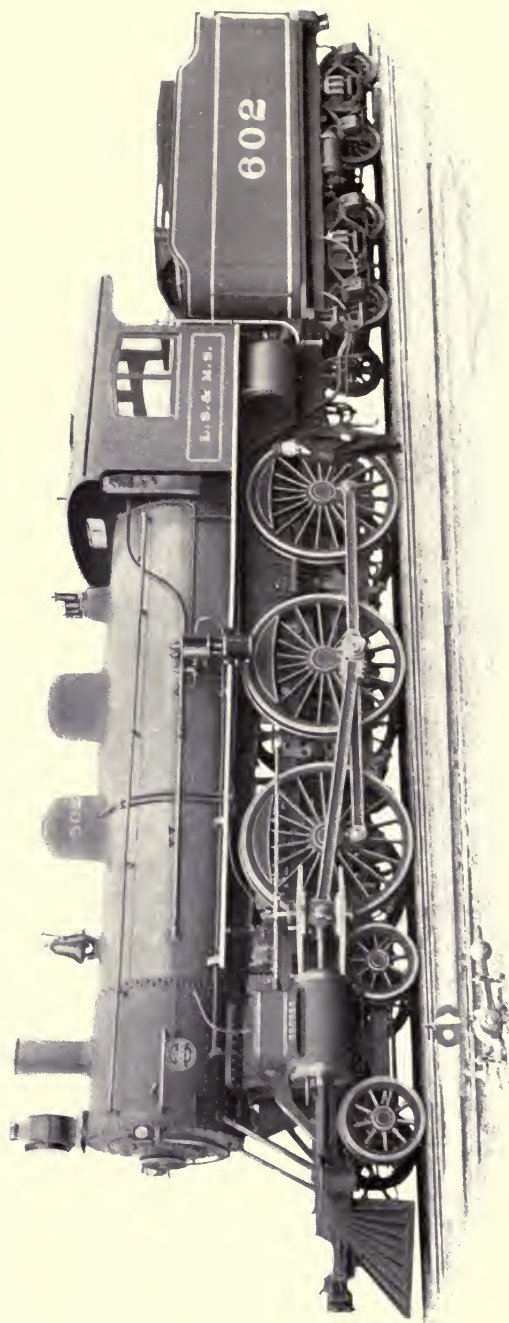
BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE GREAT NORTHERN RAILWAY.

CODE WORD, QUIESCE.
 TYPE, 10-WHEELED PASSENGER.
 WITH 8-WHEELED TENDER

SERIES, 654.
 CLASS, 20 D.
 TANK CAPACITY 4500 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple Piston Valve		20"	30"	8	33"	—	—	6	63"	4	30"	Improved Belpaire		70"	123"	41½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
303	2¼"	13'-10½"	14'-6"	14'-6"	25'-4"	53'-6"	90000	—	129500	36500	166000					
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	LIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
210				Bituminous Coal		2452	201	24	2677	35.4	1.435	4'-8½"				

FOR HAULING CAPACITY SEE PAGE 290.



THE HEAVIEST EXPRESS PASSENGER LOCOMOTIVE EVER BUILT

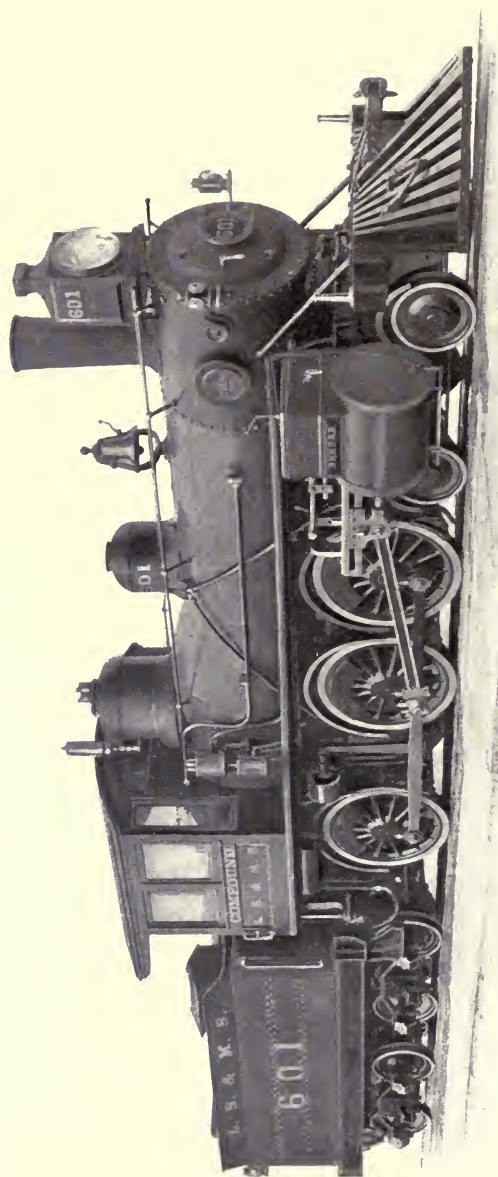
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

October, 1899.
FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CODE WORD, QUIET. SERIES, 720.
TYPE, 10-WHEELED EXPRESS PASSENGER. CLASS, 20 D.
WITH 8-WHEELED TENDER TANK CAPACITY 5000 U. S. GALLONS AND 9½ TONS FUEL.

CYLINDERS			WHEELS						BOILER		FIRE BOX			
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple	20"	28"	8	36"	—	—	6	80"	4	36"	Rad. Stay, Wagon Top	Long, Wide, Sloping	121"	41"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
345	2"	15'-0½"	16'-6"	16'-6"	27'-4"	55'-2½"	112000	—	133000	38600	171600			
BOILER PRESSURE			FUEL		HEATING SURFACE, SQ. FT.			GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES		FEET		INCHES	
210	Bituminous Coal		2694	191	32	2917	33.6	1.435	4'-8½"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1893

FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CODE WORD, QUIETUS.

TYPE, 10-WHEELED FREIGHT.

WITH 8-WHEELED TENDER

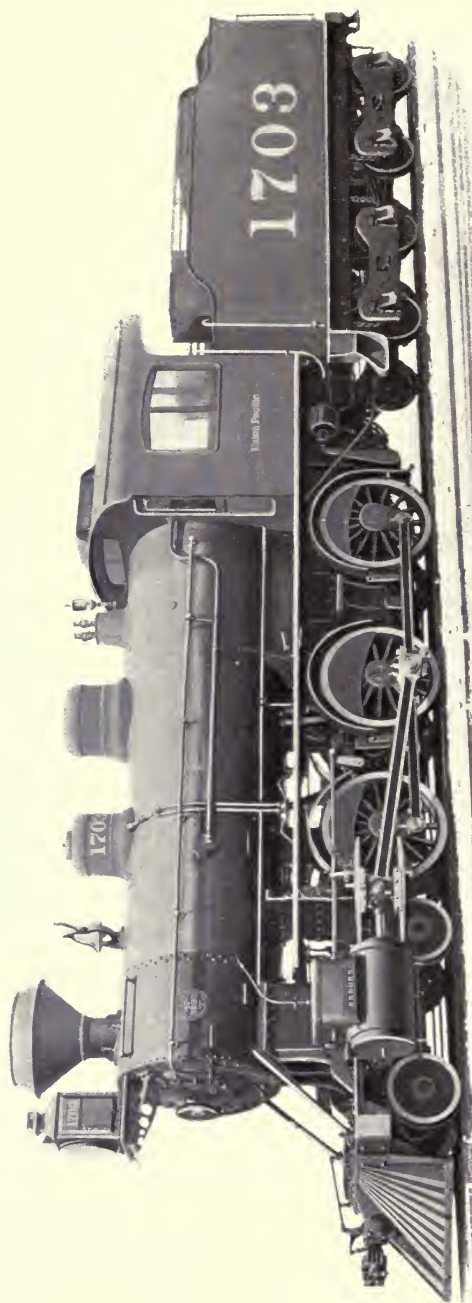
SERIES, 489.

CLASS, A₃¹⁸₈₄ D.

TANK CAPACITY 3700 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.		
2 Cyl. Compound	18" H. P. 23½" L. P.	24"	8	33"	—	6	56"	4	28"	Crown Bar, Wagon Top	96" 34½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER		TENDER	TRAILING WHEELS	DRIVERS	TOTAL ENGINE
186	2"	12'-0 1/16"	13'-3"	8'-0"	23'-1 1/2"	45'-6 1/2"	78000	—	—	80000	105000
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180	Bituminous Coal			1168	112	18	1298	23.0	1.435	4'-8 1/2"	

FOR HAULING CAPACITY SEE PAGE 290.



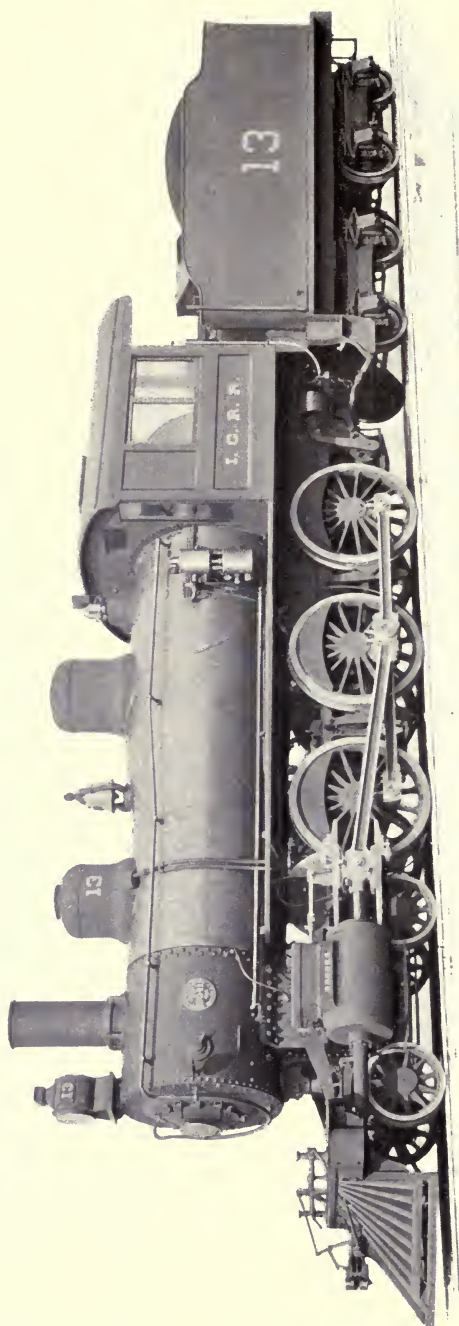
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1899
FOR THE UNION PACIFIC RAILROAD.

CODE WORD, QUILL. SERIES, 700.
TYPE, 10-WHEELED FREIGHT. CLASS, 20 D.
WITH 8-WHEELED TENDER TANK CAPACITY 5000 U. S. GALLONS AND 12½ TONS FUEL.

CYLINDERS				WHEELS				ROILER			FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.		
Simple	20"	28"	8	33"	—	—	6	57"	4	30"	Crown Bar, Wagon Top	Long, Wide 114" 41"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
342	2"	13'-2 ³ / ₈ "	14'-6"	14'-6"	24'-9"	52'-4 ¹ / ₂ "	102000	—	130000	35000	165000	
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.		GAUGE OF TRACK		
				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
200	Bituminous Coal				2343	211	20	2574	31.3	1.435	4'-8 ¹ / ₂ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

8981

FOR THE ILLINOIS CENTRAL RAILROAD.

CODE WORD, QUILLETOR.

SERIES, 669.

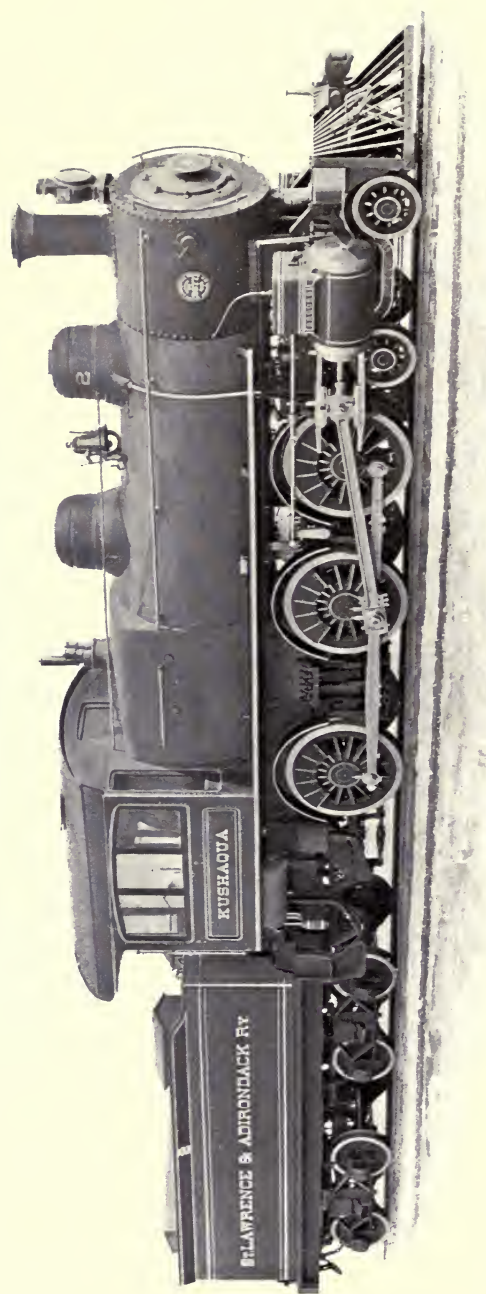
TYPE, 10-WHEELED FREIGHT.

CLASS, 20 D.

WITH 8-WHEELED TENDER

TANK CAPACITY 5000 U. S. GALLONS AND 9½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple		20"	28"	8	36"	—	—	6	63"	4	33"	Rad. Stay, Wagon Top	66"	Long, Sloping	121"	33½"	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
304	2"	14'-0"	13'-6"	13'-6"	24'-4"	51'-3"	102000	—	123000	32000	155000						
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
180				Bituminous Coal				2204	197	—	2401	27.2	1.435	4'-81"			
				POUNDS PER SQ. INCH ABOVE ATMOSPHERE													



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1896
 FOR THE ST. LAWRENCE & ADIRONDACK RAILWAY.

CODE WORD, QUILTED.
 TYPE, 10-WHEELED PASSENGER.

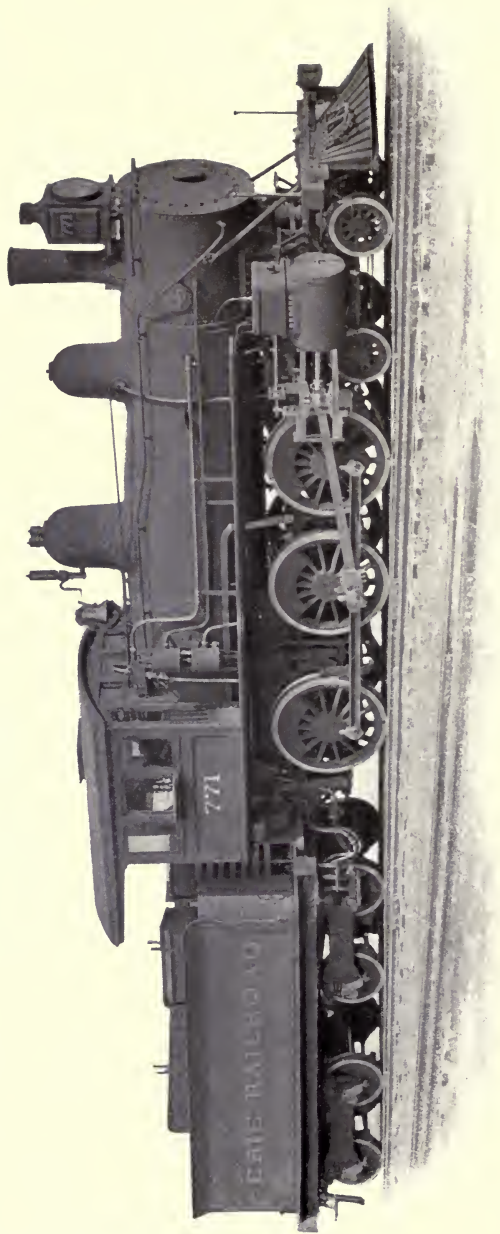
SERIES, 578.
 CLASS, 20 D.

WITH 8-WHEELED TENDER

TANK CAPACITY 4500 U. S. GALLONS AND $8\frac{1}{2}$ TONS FUEL.

CYLINDERS				WHEELS						BOILER			FIRE BOX						
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		DIA.	TYPE	LENGTH	WIDTH		
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.								
Simple		20"	26"	8	33"	—	—	6	57"	4	28"	Improved Belpaire		64"	Long, Wide Sloping		113"	40 $\frac{1}{2}$ "	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS											
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	GAUGE OF TRACK							
278	2"	12'-7 $\frac{1}{4}$ "	14'-6"	14'-6"	24'-8"	52'-7"	90000	—	126000	28000	154000	SQUARE FEET		32.0	1.435		4'-8 $\frac{1}{2}$ "		
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.						GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET <th colspan="2">METRES<th colspan="2">FEET<th colspan="2">INCHES<th colspan="2"></th></th></th></th>		METRES <th colspan="2">FEET<th colspan="2">INCHES<th colspan="2"></th></th></th>		FEET <th colspan="2">INCHES<th colspan="2"></th></th>		INCHES <th colspan="2"></th>				
195				Bituminous Coal		1824	168	24	2016	32.0		1.435		4'-8 $\frac{1}{2}$ "					

FOR HAULING CAPACITY SEE PAGE 250.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1896

FOR THE ERIE RAILROAD.

CODE WORD, QUINATE.

TYPE, 10-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

SERIES, 586.

CLASS, 20 D.

TANK CAPACITY 4500 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS

WHEELS

BOILER

FIRE BOX

TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	20"	26"	8	36"	—	—	6	62"	4	30"	Rad. Stay, Wagon Top	64"	Long, Wide	107½"	40½"

FLUES

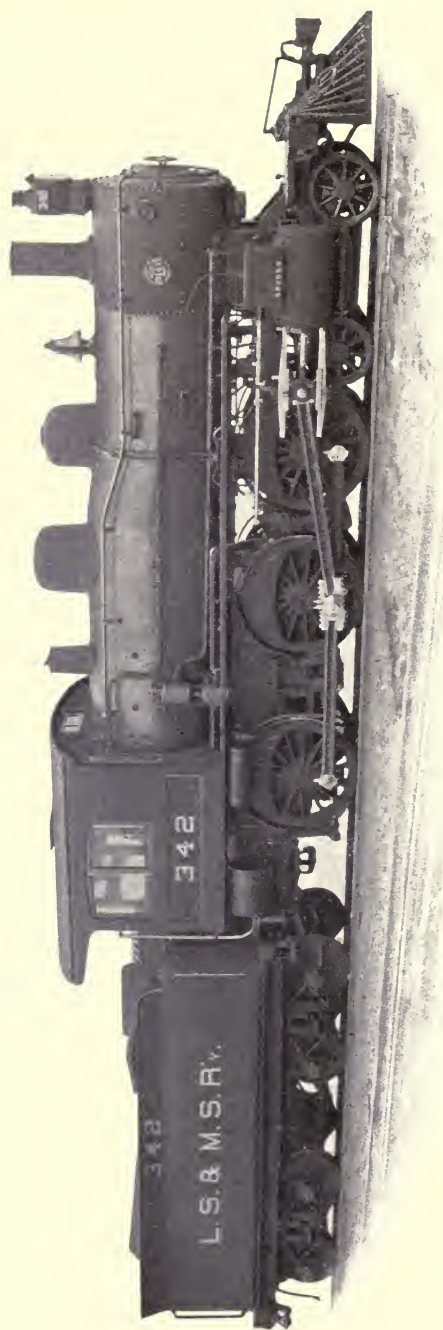
WHEEL BASE

AVERAGE WEIGHT IN WORKING ORDER, POUNDS

NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
282	2"	13'-2"	13'-6"	13'-6"	24'-2"	50'-6"	93000	—	108000	36750	144750

BOILER PRESSURE		FUEL	HEATING SURFACE, SQ. FT.			GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE		KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180		Bituminous Coal	1931	121	—	2052	29.7	1.435	4'-8½"	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 PUNKIRK, N. Y., U.S.A.

1899
 FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CODE WORD, QUINCE.

TYPE, 10-WHEELED FREIGHT.

WITH 8-WHEELED TENDER

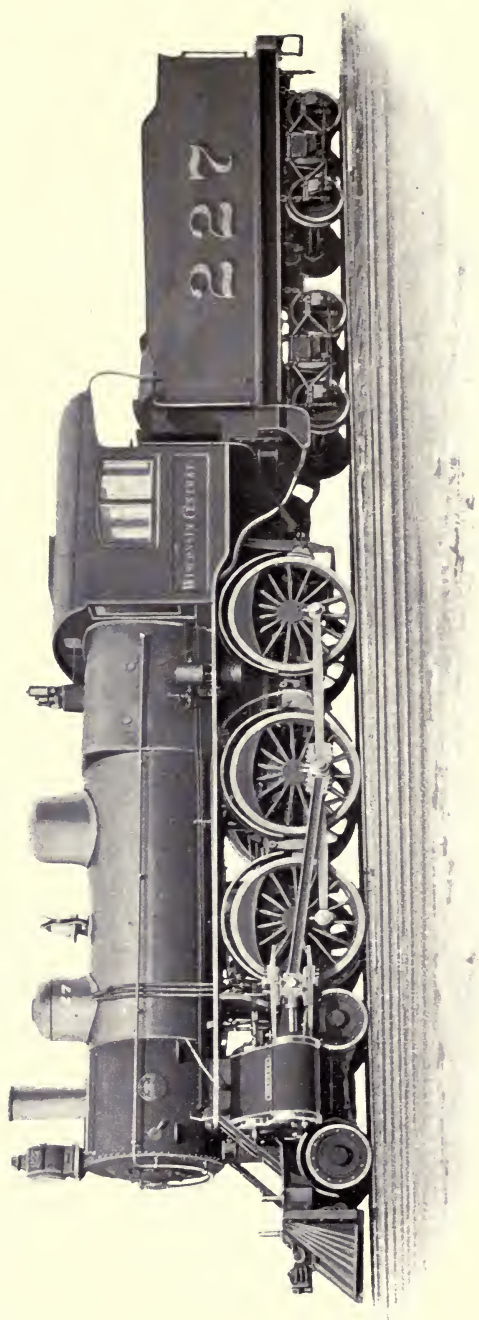
SERIES, 684.

CLASS, 19½ D.

TANK CAPACITY 5000 U. S. GALLONS AND 10 TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		DIA.	TYPE	LENGTH	WIDTH
Simple		19½"	30"	8	36"	—	—	6	62"	4	33"	Rad. Stay, Wagon Top		64½"	Long, Wide, Sloping	114"	42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	GAUGE OF TRACK					
286	2"	13'-3 ⁵ / ₁₆ "	15'-0"	15'-0"	25'-6"	52'-9 ¹ / ₄ "	103000	—	120000	34000	154000	GAUGE OF TRACK					
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
180				Bituminous Coal	1971	178	24	2173	32.4	1.435	4'-8½"						

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1898

FOR THE WISCONSIN CENTRAL LINES.

CODE WORD, QUINIC.

TYPE, 10-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

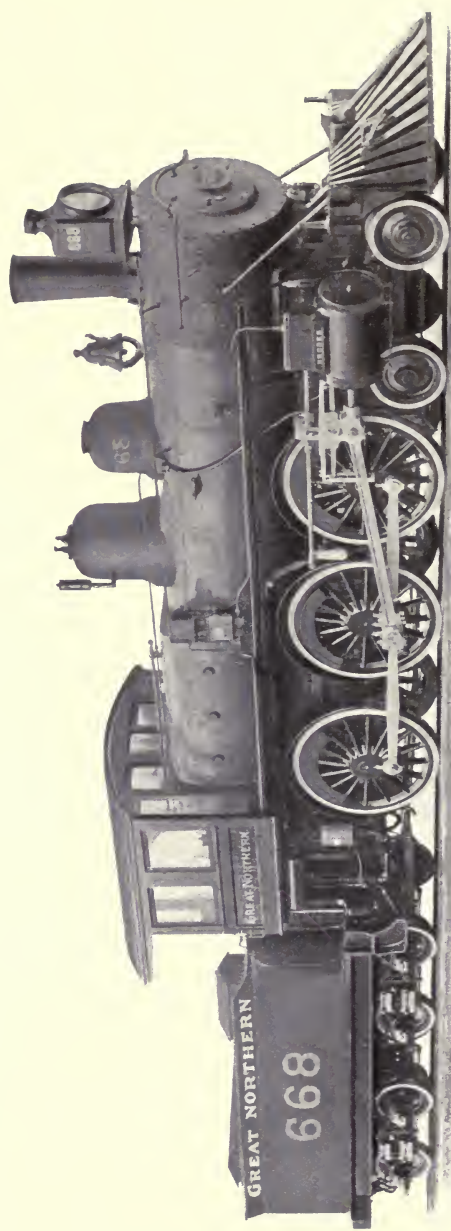
SERIES, 637.

CLASS, 19 D.

TANK CAPACITY 4500 U. S. GALLONS AND 10 TONS FUEL

CYLINDERS				WHEELS				BOILER			FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	DIA.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	LEADING DIA.	TYPE	DIA.	TYPE	LENGTH WIDTH
Simple Piston Valve	19"	26"	8	33"	—	—	6	69"	4	33"	Improved Belpaire	Long, Wide, Sloping 113" 41 3/8"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
308	2"	13'-2 1/4"	14'-6"	14'-6"	24'-9"	52'-1"	94000	—	115000	34000	149000	
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
200				Bituminous Coal	2111	165	24	2300	32.4	1.435	4'-8 1/2"	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1893

FOR THE GREAT NORTHERN RAILWAY.

CODE WORD, QUININE.

TYPE, 10-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

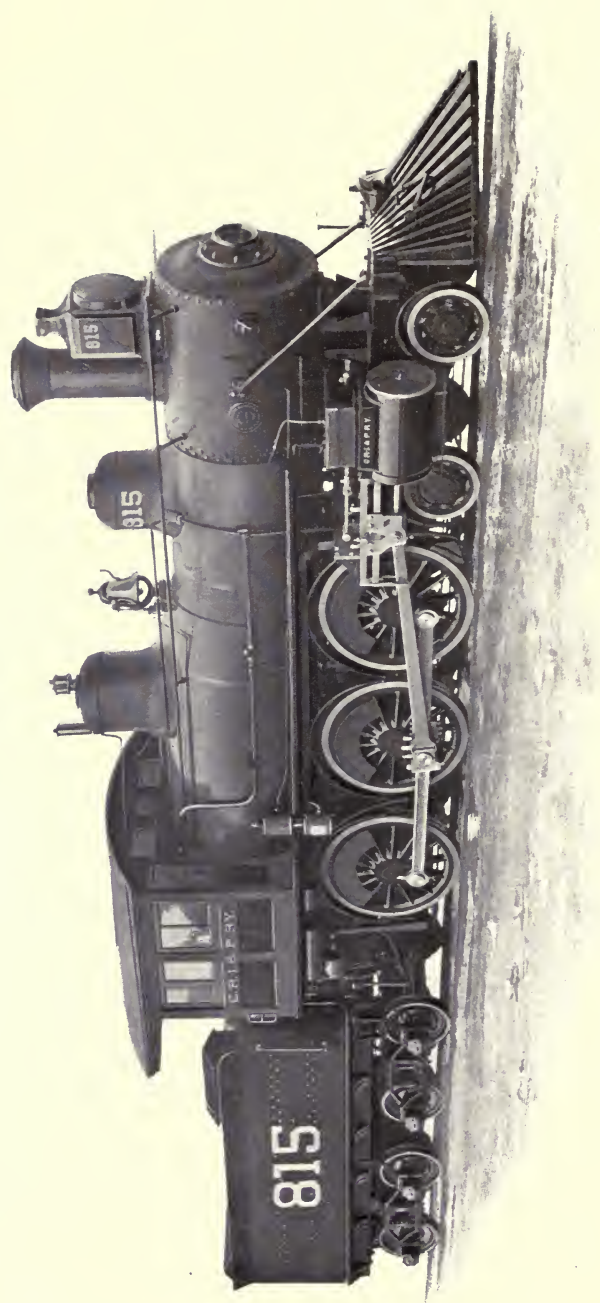
SERIES, 485.

CLASS, 19 D.

TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER			FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple		19"	26"	8	33"	—	—	6	72"	4	33"	Improved Belpaire	60"	Long, Sloping	114"	32"	
AVERAGE WEIGHT IN WORKING ORDER, POUNDS																	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH		DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS			TOTAL ENGINE			
202	21 $\frac{1}{2}$ "	13'-10"		14'-6"	14'-6"	25'-0"	52'-4"	86000	—	111000	27000			138000			
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES		FEET		INCHES			
180				1646	152	—	1798	25.3		1.435		4'-8 $\frac{1}{2}$ "					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1892

FOR THE CHICAGO, ROCK ISLAND & PACIFIC RAILWAY.

CODE WORD, QUINISM.

TYPE, 10-WHEELED FREIGHT.

WITH 8-WHEELED TENDER

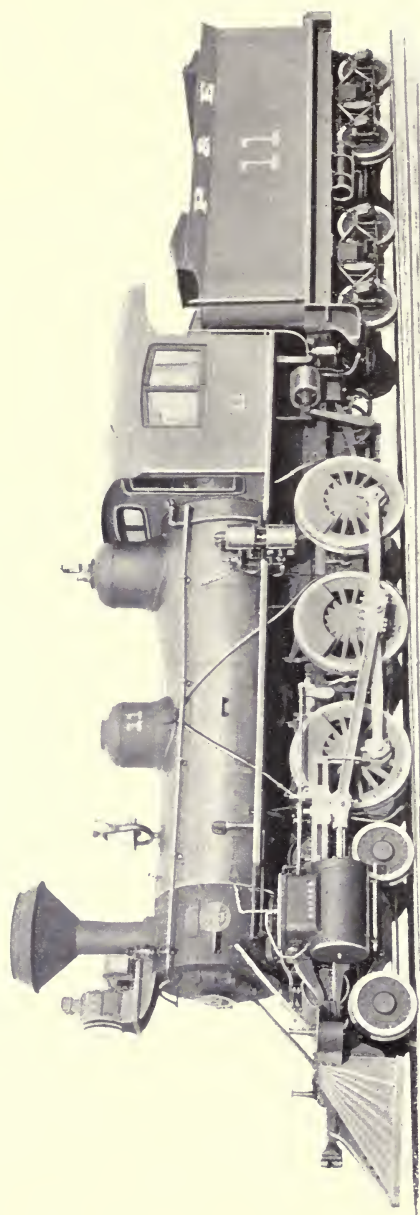
SERIES, 439.

CLASS, 19 D.

TANK CAPACITY 3600 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING	COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.		NO.	DIA.	NO.	DIA.					
Simple	19"	24"	8	33"	—	6	63 $\frac{3}{4}$ "	4	30"	Rad. Stay, Wagon Top	60"	Long, Sloping	103"	34 $\frac{1}{2}$ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
254	2"	13'-1"	12'-4"	12'-4"	23'-0"	46'-10"	76000	—	106500	25500	132000			
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.			GRATE AREA		GAUGE OF TRACK			
				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
160	Bituminous Coal				1740	140	18	1898	24	1.435	4'-8 $\frac{1}{2}$ "			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1898

FOR THE PRESCOTT & EASTERN RAILROAD.

CODE WORD, QUINNAT.

TYPE, 10-WHEELED FREIGHT.

WITH 8-WHEELED TENDER

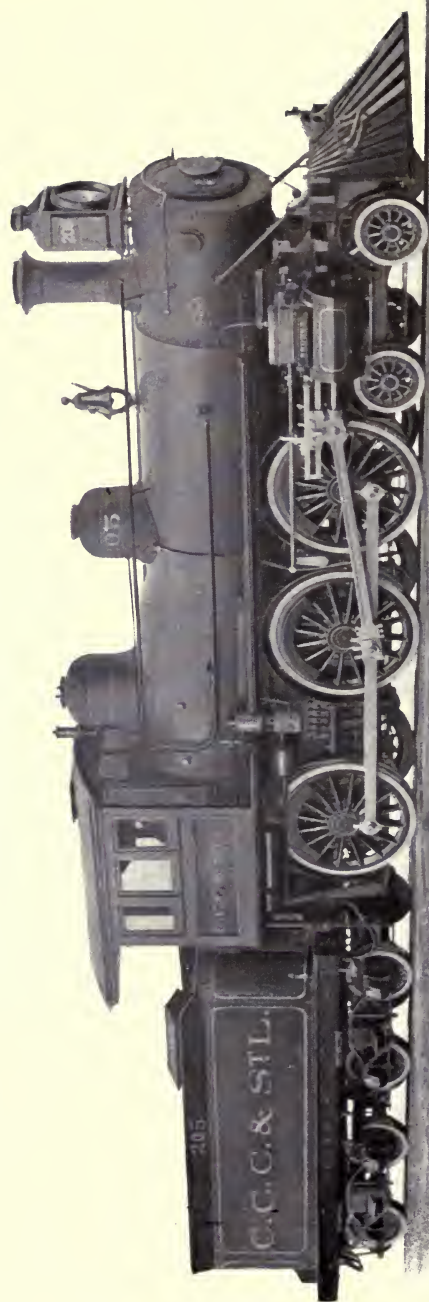
SERIES, 504 C.

CLASS, 19 D.

TANK CAPACITY 4500 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER			FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
224	2"	12'-7 $\frac{1}{8}$ "	12'-0"	12'-0"	21'-10"	48'-10 $\frac{3}{4}$ "	90000	—	106000	24000	130000					
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
180				Bituminous Coal	1464	142	—	1606	24	1.435	4'-8 $\frac{1}{2}$ "					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

FOR THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY.
1893

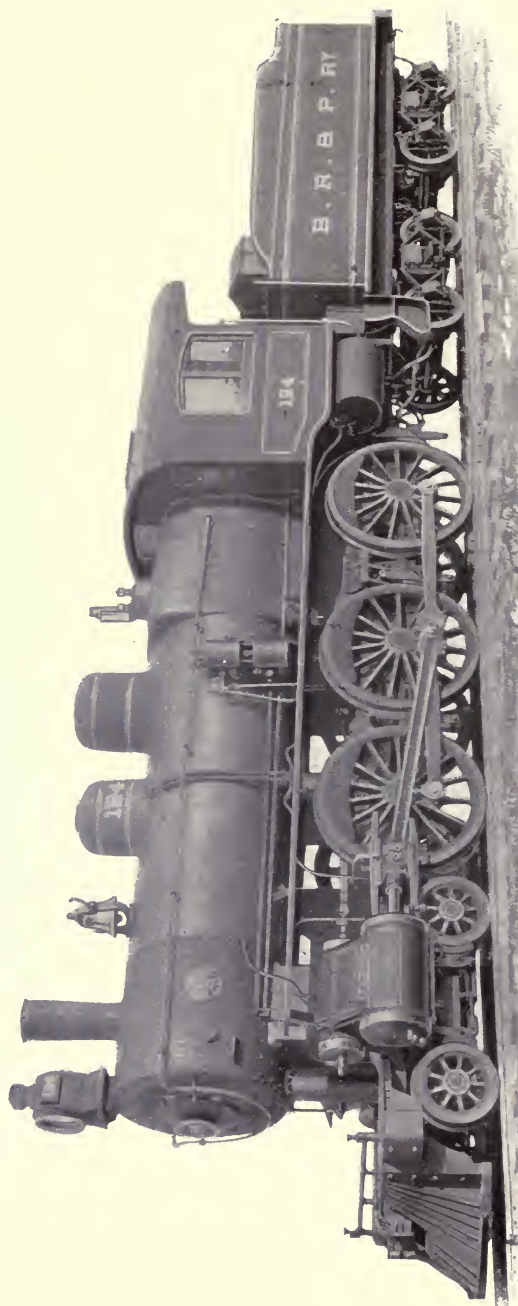
CODE WORD, QUINOGEN.
TYPE, 10-WHEELED PASSENGER.

SERIES, 517.
CLASS, 18½ D.

WITH 8-WHEELED TENDER
TANK CAPACITY 4000 U. S. GALLONS AND 8 TONS FUEL.

CYLINDERS				WHEELS				BOILER			
TYPE	DIA.	STROKE	TENDER		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE
			NO.	DIA.	NO.	DIA.	NO.	DIA.			
Simple	18½"	24"	8	33"	—	68"	4	30"	Crown Bar, Wagon Top	58"	Long, Wide, Sloping
											102" 42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
252	2"	13'-10⅛"	15'-6"	9'-0"	25'-8"	49'-0"	90000	—	109500	26000	135500
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.			
								GRATE AREA			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	GAUGE OF TRACK
180				Bituminous Coal	1819	155	—	1974	29.1	1.435	4'-8½"

FOR HAULING CAPACITY SEE PAGE 290.

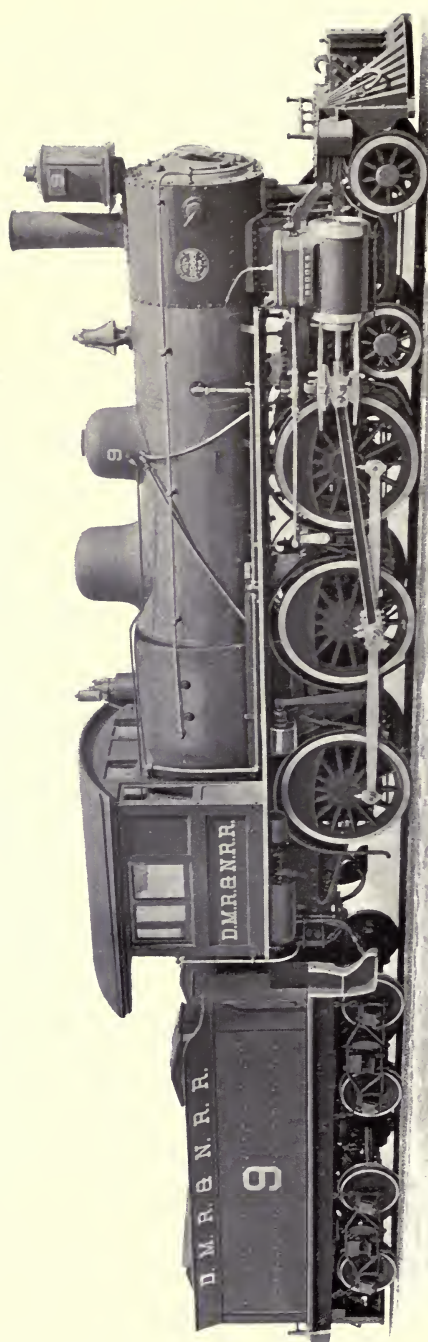


BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1898
FOR THE BUFFALO, ROCHESTER & PITTSBURG RAILWAY.

CODE WORD, QUINOME. SERIES, 681.
TYPE, 10-WHEELED PASSENGER. CLASS, 18 D.
WITH 8-WHEELED TENDER TANK CAPACITY 4500 U. S. GALLONS AND 10½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER	TRAILING	COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	NO.	NO.	DIA.	NO.	DIA.					
Simple Piston Valve	18"	26"	8	33½"	—	6	69"	30½"	Improved Belpaire	62"	Long, Wide, Sloping	108"	42"
FLUES			WHEEL BASE			AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE		
272	2"	13'-2½"	14'-0"	14'-0"	24'-3"	51'-10¾"	103000	—	109000	33000	142000		
BOILER PRESSURE				FUEL			HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES	
200				Bituminous Coal	1862	157	—	2019	30.8	1.435	4'-8½"		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1898

FOR THE DULUTH, MISSISSIPPI RIVER & NORTHERN RAILROAD.

CODE WORD, QUINOVIC.

TYPE, 10-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

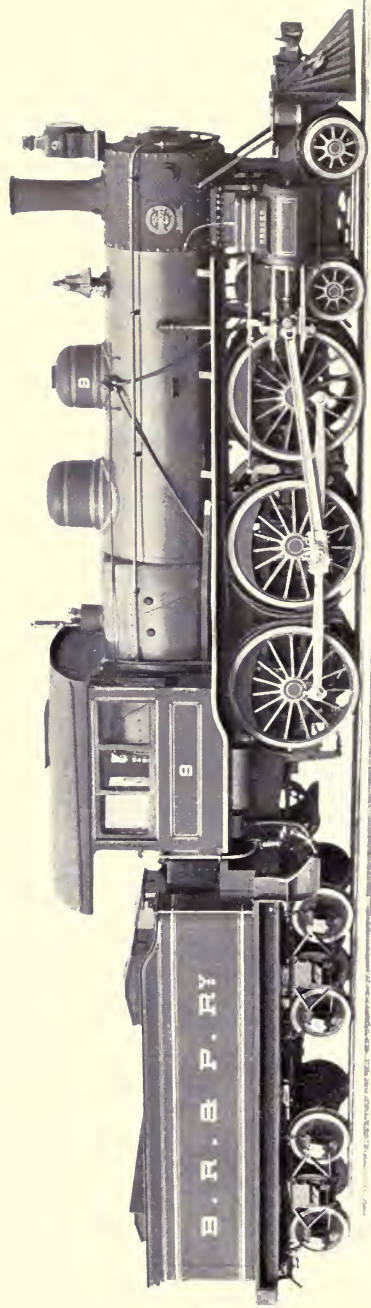
TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

SERIES, 658.

CLASS, 18 D.

CYLINDERS				WHEELS				BOILER		FIRE BOX								
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		DIA.	LENGTH		WIDTH	
Simple		18"	24"	8	33"	—	—	6	63"	4	30"	Improved Belpaire		56"	97"	32"		
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS										
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE							
225	2"	13'-4 $\frac{1}{8}$ "	14'-0"	14'-0"	24'-4"	51'-1 $\frac{1}{8}$ "	85000	—	97800	30000	127800							
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES						
180				Bituminous Coal	1562	119	—	1681	20.92	1.435	4'-8 $\frac{1}{2}$ "							

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

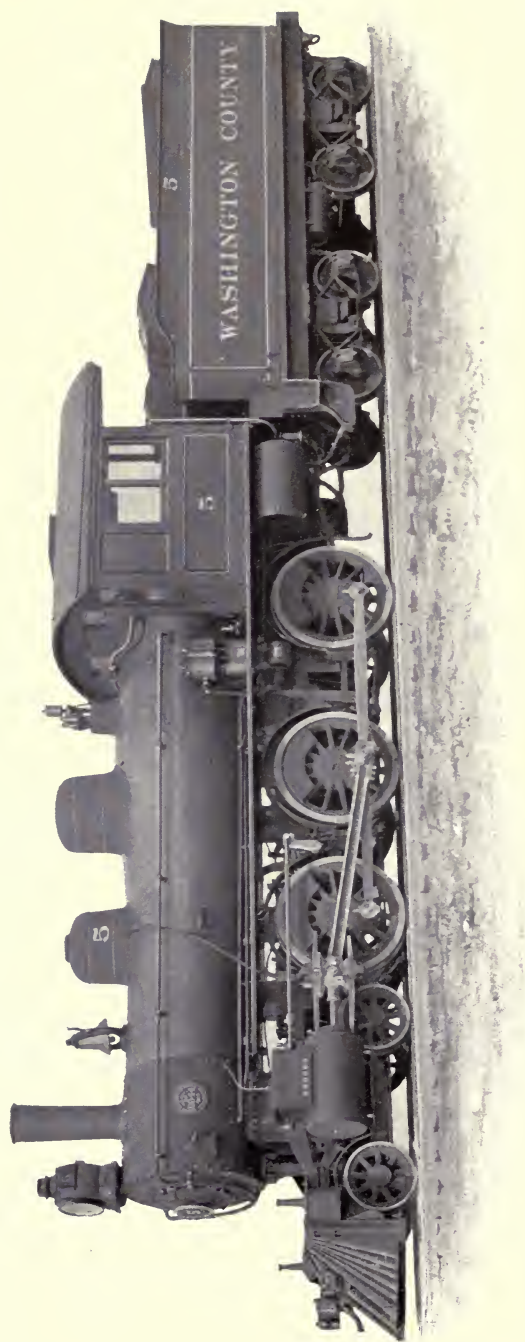
1897
 FOR THE BUFFALO, ROCHESTER & PITTSBURG RAILWAY.

CODE WORD, QUINOYL. SERIES, 619.
 TYPE, 10-WHEELED PASSENGER. CLASS, 18 D.

WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING	COUPLED DRIVERS		LEADING	TYPE	DIA.	LENGTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.			
Simple	18"	24"	8	33"	—	—	6	68"	Improved Belpaire	57"	97"
								30"	Long, Sloping		32"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER		TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS
225	2"	13'-4 ¹¹ / ₈ "	13'-0"	13'-0"	23'-2"	50'-7"		89000	—	96000	29000
											125000
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.			
				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	GAUGE OF TRACK
										METRES	FEET
180				Bituminous Coal		1563	122	—	1685	21.2	1.435
											4'-8 ¹ / ₂ "

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1898
FOR THE WASHINGTON COUNTY RAILROAD.

CODE WORD, QUINQUE. SERIES, 646.
TYPE, 10-WHEELED FREIGHT. CLASS, 18 D.

WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
AVERAGE WEIGHT IN WORKING ORDER, POUNDS																
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
225	2"	12'-7"	13'-6"	13'-6"	23'-4"	50'-1"	84000	—	94400	24400	118800					
BOILER PRESSURE				FUEL			HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
180				Bituminous Coal		1474	134	—	1608	21.8	1.435	4'-8½"				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1898

FOR THE INDIANA & ILLINOIS SOUTHERN RAILROAD.

CODE WORD, QUINSY.

SERIES, 649.

TYPE, 10-WHEELED FREIGHT.

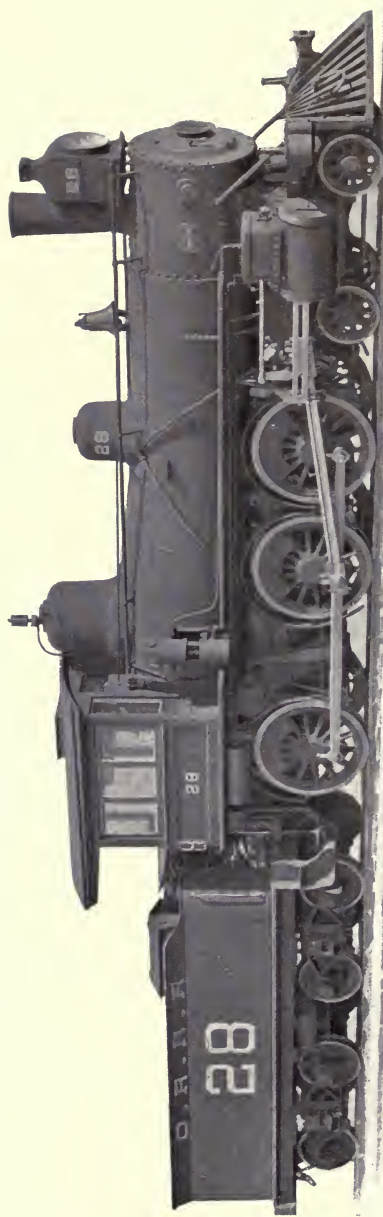
CLASS, 18 D.

WITH 8-WHEELED TENDER

TANK CAPACITY 3700 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS			WHEELS						BOILER		FIRE BOX			
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple	18"	24"	8	33"	—	—	6	56"	4	28"	56"	Long, Sloping	96"	34"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
225	2"	12'-7 $\frac{1}{8}$ "	13'-6"	13'-6"	23'-4"	49'-10"	77000	—	95700	26550	122250			
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
180			Bituminous Coal	1472	130	16.5	1618.5	21	1.435	4'-8 $\frac{1}{2}$ "				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1896

FOR THE OHIO RIVER RAILROAD.

CODE WORD, QUINTAL.
 TYPE, 10-WHEELED FREIGHT.
 WITH 8-WHEELED TENDER

SERIES, 577.
 CLASS, 18 D.
 TANK CAPACITY 3000 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		LENGTH WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple		18"	24"	8	33"	—	—	6	56"	4	28"	Crown Bar, 54" Wagon Top		Deep	72" 34½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
206	2"	13'-3"	13'-9"	8'-6"	25'-0"	46'-11"	64000	—	78000	28000	106000				
BOILER PRESSURE			FUEL		HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES	FEET	INCHES			
140			Bituminous Coal		1383	114	—	1497	16.7	1.435	4'-8½"				

FOR HAULING CAPACITY SEE PAGE 290.

BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1891

FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CODE WORD, QUINTETTE.

TYPE, 10-WHEELED PASSENGER.

WITH 8-WHEELED TENDER

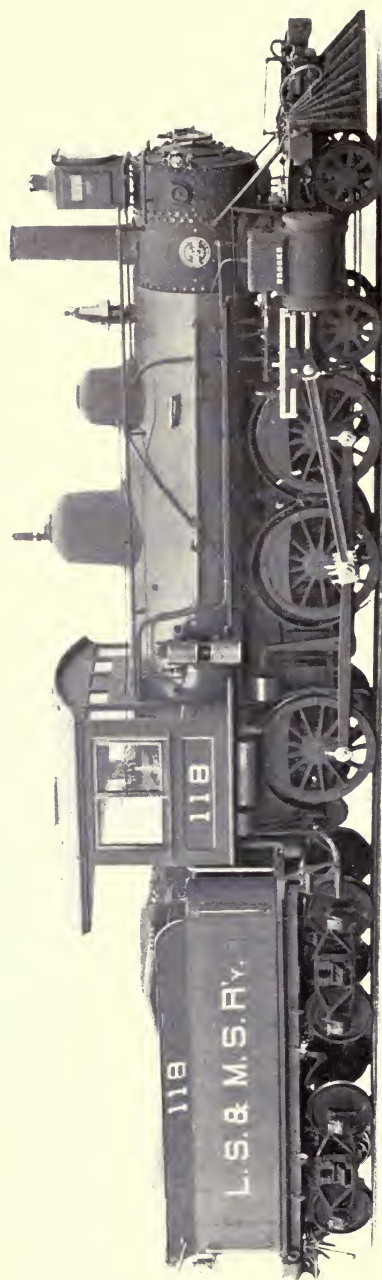
SERIES, 434.

CLASS, 17 D.

TANK CAPACITY 3700 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple				17"	24"	8	36"	—	—	6	68"	4	33"	Crown Bar, Wagon Top	Long, Wide, Sloping	96"	42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	GAUGE OF TRACK					
202	2"	13'-10 ¹ / ₁₆ "	15'-0"	8'-6"	25'-3"	47'-8"	78000	—	96000	22000	118000						
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
180				Bituminous Coal			1462	123	18	1603	28	1.435	4'-8 ¹ / ₂ "				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1897
FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CODE WORD, QUINTIC.
TYPE, 10-WHEELED FREIGHT.
WITH 8-WHEELED TENDER

SERIES, 627.
CLASS, 17 D.

TANK CAPACITY 3100 U. S. GALLONS AND 7 TONS FUEL.

CYLINDERS			WHEELS				BOILER		FIRE BOX					
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple	17"	24"	8	33"	—	—	6	56"	4	30"	Rad. Stay, Wagon Top	54"	96"	34½"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
207	2"	12'-0.3" 16	13'-3"	13'-3"	23'-7½"	45'-10"	73000	—	79500	28500	108000			
BOILER PRESSURE			FUEL				HEATING SURFACE, SQ. FT.				GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES		FEET INCHES		
160	Bituminous Coal				1292	123.3	18.6	1433.9	22.6	1.435	4'-8½"			

FOR HAULING CAPACITY SEE PAGE 290.





HEAVIEST FREIGHT LOCOMOTIVE IN THE WORLD.

This locomotive is the heaviest ever built, and is designed to haul a train weighing 2,045 tons, exclusive of engine, tender and caboose, up a grade of 38 feet per mile, combined with 3 degree curves, at a speed of 15 miles per hour.

The boiler is of the Player-Belvoir type, and the thickness of the plates, $\frac{1}{8}$ " and $\frac{1}{4}$ ", is, we believe, the greatest ever used upon locomotive boilers. The diameter at front end is 82", connection 88", and throat 91".

Nearly all parts of this locomotive usually made of cast iron are, with the exception of the cylinders, made of cast or pressed steel or malleable iron.

BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
September, 1899,

FOR THE ILLINOIS CENTRAL RAILROAD.

CODE WORD, QUIRANT.

SERIES, 707.

TYPE, 12-WHEELED FREIGHT.

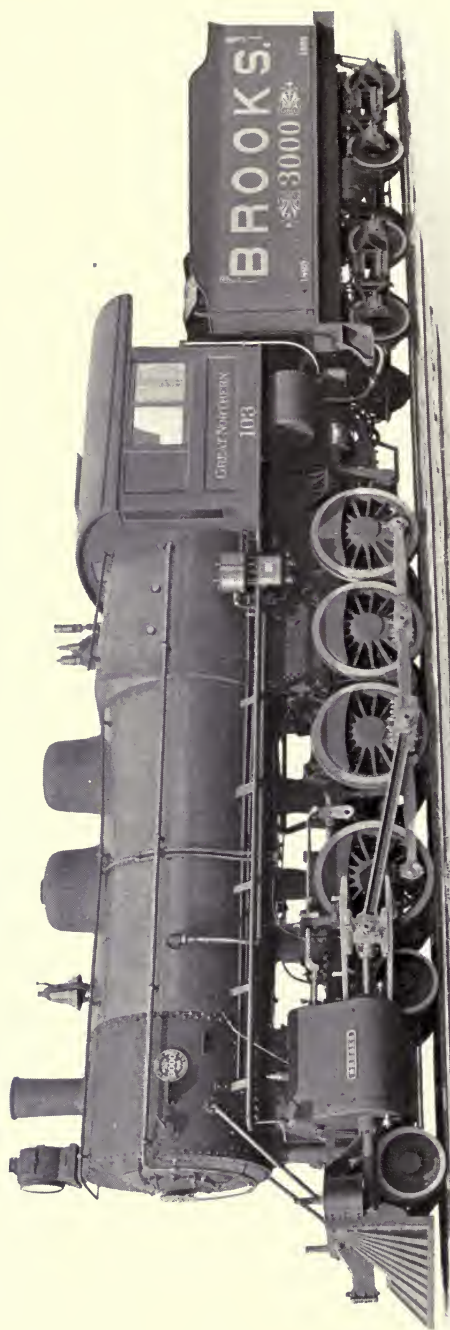
CLASS, 23 F.

WITH 8-WHEELED TENDER

TANK CAPACITY 7000 U. S. GALLONS AND 12 TONS FUEL.

CYLINDERS			WHEELS						BOILER		FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple Piston Valve	23"	30"	8	33"	—	—	8	57"	4	30"	Improved Belpaire	82"	Long, Wide	132"	42"
FLUES			WHEEL BASE					AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
424	2"	14'-8 ³ / ₈ "	15'-9"	15'-9"	26'-6"	55'-2 ³ / ₄ "	132700	—	193200	39000	232200				
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES	FEET	INCHES		
210			Bituminous Coal		3237	263	—	3500	37.5		1.435	4'-8 ¹ / ₂ "			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE GREAT NORTHERN RAILWAY.

CODE WORD, QUIRITE. SERIES, 621.
 TYPE, 12-WHEELED FREIGHT. CLASS, 21 F.
 WITH 8-WHEELED TENDER TANK CAPACITY 4500 U. S. GALLONS AND 10 TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple Piston Valve		21"	34"	8	33"	—	—	8	55"	4	33"	Improved Belpaire		78"	Long, Wide	123" 39 ³ / ₄ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
376	21"	13'-10 ³ / ₈ "	15'-10"	9'-8"	26'-8"	54'-3 ¹ / ₄ "	96000	—	172000	40750	212750					
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PILES	TOTAL	SQUARE FEET	METRES	FEET		INCHES			
210				Bituminous Coal	3045	235	—	3280	34	1.435	4'-8 ¹ / ₂ "					

FOR HAULING CAPACITY SEE PAGE 290.



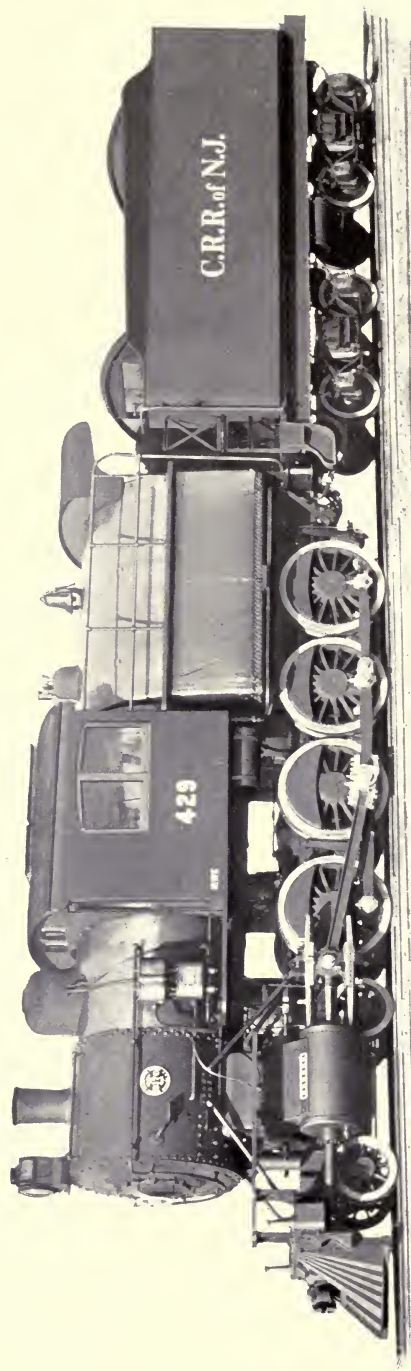
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1899
FOR THE DELAWARE, LACKAWANNA & WESTERN RAILROAD.

CODE WORD, QUIRLANE. SERIES, 715.
TYPE, 12-WHEELED FREIGHT. CLASS, 21 F.
WITH 8-WHEELED TENDER TANK CAPACITY 5000 U. S. GALLONS AND 10 TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX							
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH			
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.								
Simple Piston Valve		21"	32"	8	33"	—	—	8	54"	4	30"	Rad. Stay, Wagon Top	78"	Long, Wide	123"	97"			
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS											
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE								
410	2"	13'-10 ³ / ₈ "	15'-0"	15'-0"	25'-9"	50'-4 ¹ / ₂ "	112000	—	166000	39000	205000								
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA				GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES		FEET		INCHES			
200				Fine Anthracite Coal		2950	218	—	3168	82.4		1.435		4'-8 ¹ / ₂ "					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1899

FOR THE CENTRAL RAILROAD OF NEW JERSEY.

CODE WORD, QUIRLER. SERIES, 688.
TYPE, 12-WHEELED FREIGHT. CLASS, 21 F.
WITH 8-WHEELED TENDER TANK CAPACITY 7000 U. S. GALLONS AND 12½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX		
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		TYPE	DIA.	TYPE	LENGTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple Piston Valve	21"	32"	8	33"	—	—	8	55"	Rad. Stay, Wagon Top	78"	Long, Wide	123" 97"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
410	2"	13'-10½"	15'-0"	15'-0"	25'-9"	53'-0"	138600	—	159000	42000	201000	
BOILER PRESSURE			FUEL		HEATING SURFACE, SQ. FT.			GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES	
200			Fine Anthracite Coal	2950	218	—	3168	82.4	1.435	4'-8½"		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1899

FOR THE UNION PACIFIC RAILROAD,

CODE WORD, QUITTAL. SERIES, 699.
TYPE, 12-WHEELED FREIGHT. CLASS, 21 F.
WITH 8-WHEELED TENDER TANK CAPACITY 5000 U. S. GALLONS AND 10½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX	
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE		
382	2"	13'-10 ³ / ₈ "	15'-11"	15'-11"	26'-7"	53'-10 ¹ / ₂ "	106000	—	163000	34000	197000	Long, Wide	124" 41"
AVERAGE WEIGHT IN WORKING ORDER, POUNDS													
FLUES				WHEEL BASE			AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES	
200				Bituminous Coal	2749	208	23	2980	34	1.435	4'-8 ¹ / ₂ "		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1898

FOR THE CHICAGO, INDIANAPOLIS & LOUISVILLE RAILROAD.

CODE WORD, QUITTOR.

TYPE, 12-WHEELED FREIGHT.

WITH 8-WHEELED TENDER

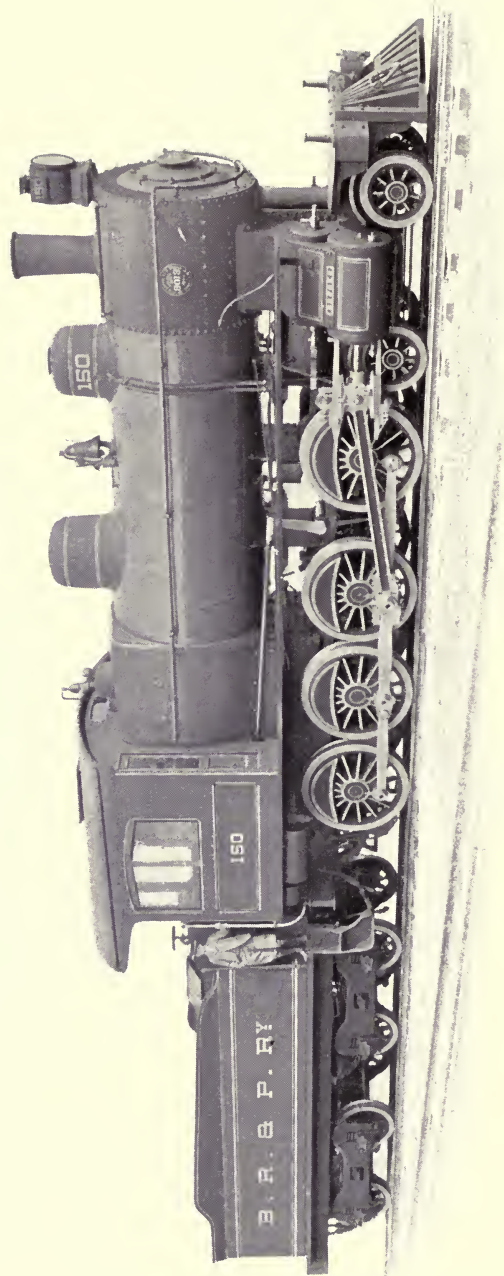
TANK CAPACITY 4500 U. S. GALLONS AND 10 TONS FUEL.

SERIES, 650.

CLASS, 21 F.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple Piston Valve		21"	26"	8	33"	—	—	8	54"	4	30"	Improved Belpaire		121"	42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
300	21 $\frac{1}{4}$ "	13'-10 $\frac{1}{4}$ "	15'-4"	15'-4"	25'-11"	54'-6 $\frac{1}{2}$ "	90000	—	140000	32000	172000				
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
200				Bituminous Coal		2436	214	24	2674	34.4	1.435	4'-8 $\frac{1}{2}$ "			

FOR HAULING CAPACITY SEE PAGE 290.

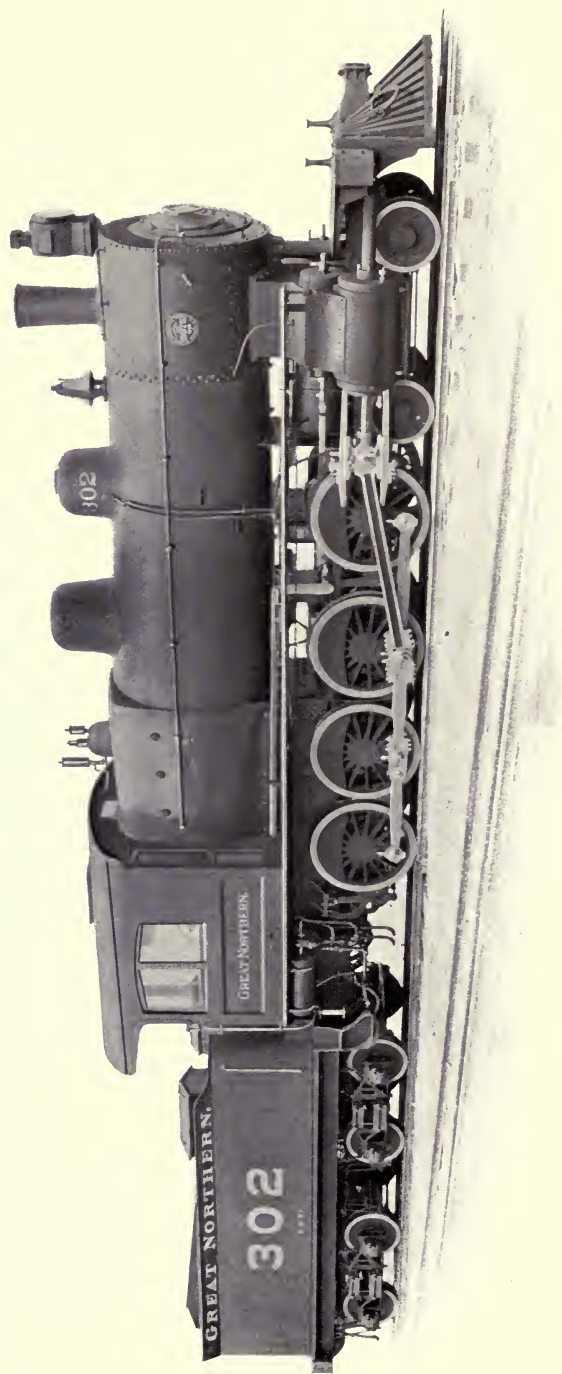


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE BUFFALO, ROCHESTER & PITTSBURGH RAILROAD.

CODE WORD, QUIVER. SERIES, 663.
 TYPE, 12-WHEELED FREIGHT. CLASS, 20 F.
 WITH 8-WHEELED TENDER TANK CAPACITY 4500 U. S. GALLONS AND 10 TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple Piston Valve	20"	26"	8	33½"	—	—	8	55"	4	30½"	Improved Belpaire	66"	Long, Wide	114"	42"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
308	2"	13'-2¼"	15'-6"	15'-6"	25'-8"	51'-5¼"	96000	—	126000	30000	156000				
BOILER PRESSURE			FUEL		HEATING SURFACE, SQ. FT.			GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
200	Bituminous Coal		2108	190	—		2298	32.4	1.435	4'-8½"					

FOR HAULING CAPACITY SEE PAGE 290.

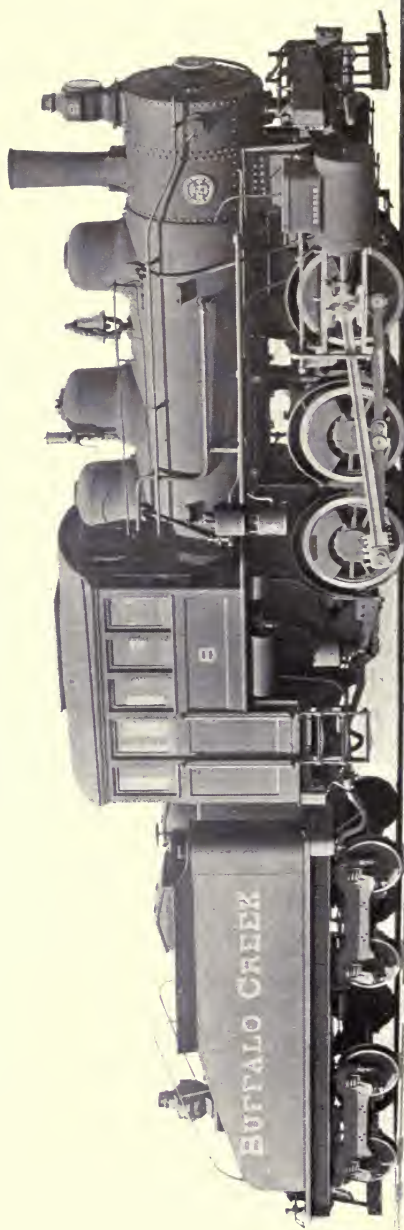


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE GREAT NORTHERN RAILWAY.

CODE WORD, QUIVOX. SERIES, 655.
 TYPE, 12-WHEELED FREIGHT. CLASS, 19 F.
 WITH 8-WHEELED TENDER TANK CAPACITY 4500 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH	
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple Piston Valve		19"	32"	8	33"	—	—	8	55"	4	30"	Improved Belpaire	Long, Wide	124"	42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
324	21 $\frac{1}{4}$ "	13'-10 $\frac{1}{2}$ "	15'-4"	9'-8"	26'-1"	53'-9 $\frac{1}{4}$ "	92000	—	142000	34000	176000				
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
200			Bituminous Coal	2622	224	26	2872	35.2	1.435	4'-8 $\frac{1}{2}$ "					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE BUFFALO CREEK RAILROAD.

CODE WORD, QUODDA. SERIES, 599.
 TYPE, 6-WHEELED SWITCHER. CLASS, 20 H.
 WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 5 TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.		
Simple	20"	24"	8	33"	—	—	6	50"	—	—	Rad. Stay, Straight Top	96"
											Long, Wide	42"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
224	2"	11'-1 $\frac{1}{4}$ "	10'-8"	10'-8"	10'-8"	42'-6 $\frac{3}{4}$ "	75000	—	124800	—	124800	
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.		GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
160				Bituminous Coal	1293	133	—	1426	27.9	1.435	4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.

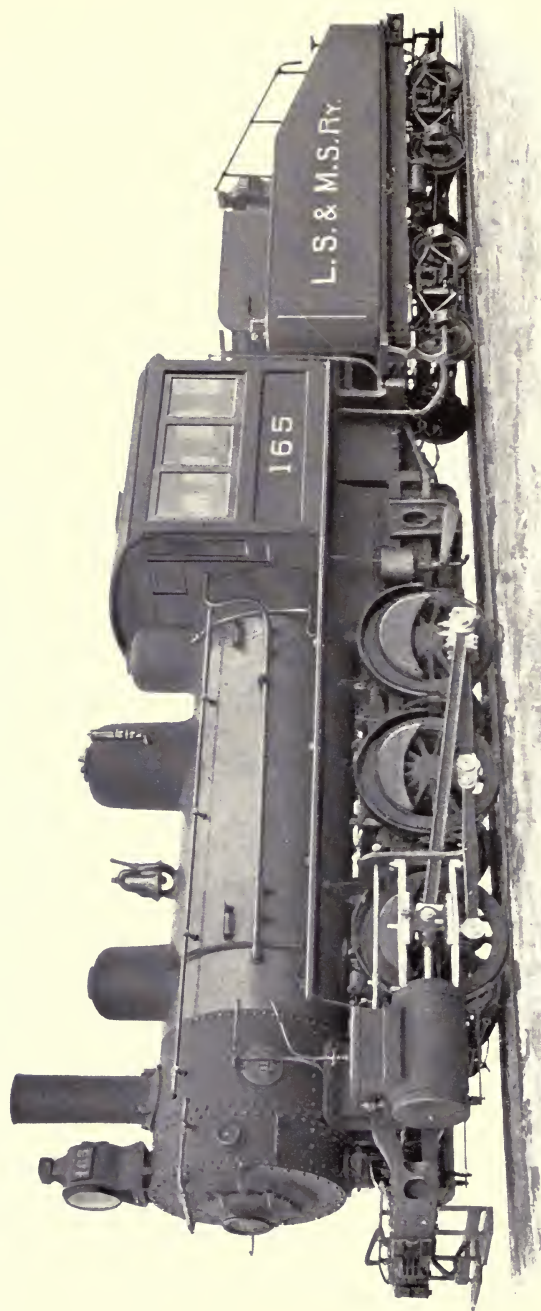


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE GREAT NORTHERN RAILWAY.

CODE WORD, QUODIG. SERIES, 671.
 TYPE, 6-WHEELED SWITCHER. CLASS, 19 H.
 WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS				WHEELS						BOILER			FIRE BOX						
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		DIA.	TYPE		LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.								
Simple Piston Valve		19"	28"	8	33"	—	—	6	49"	—	—	Improved Belpaire		66"	Long, Wide		114"	42"	
FLUES				WHEEL BASE						AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.		DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE							
284		2"	11'-11"	11'-0"	11'-0"	11'-0"	42'-2 $\frac{1}{4}$ "	80000	—	137000	—	137000							
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.						GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES							
200				Bituminous Coal		1634	188	20	1842	32.4	1.435	4'-8 $\frac{1}{2}$ "							

FOR HAULING CAPACITY SEE PAGE 290.



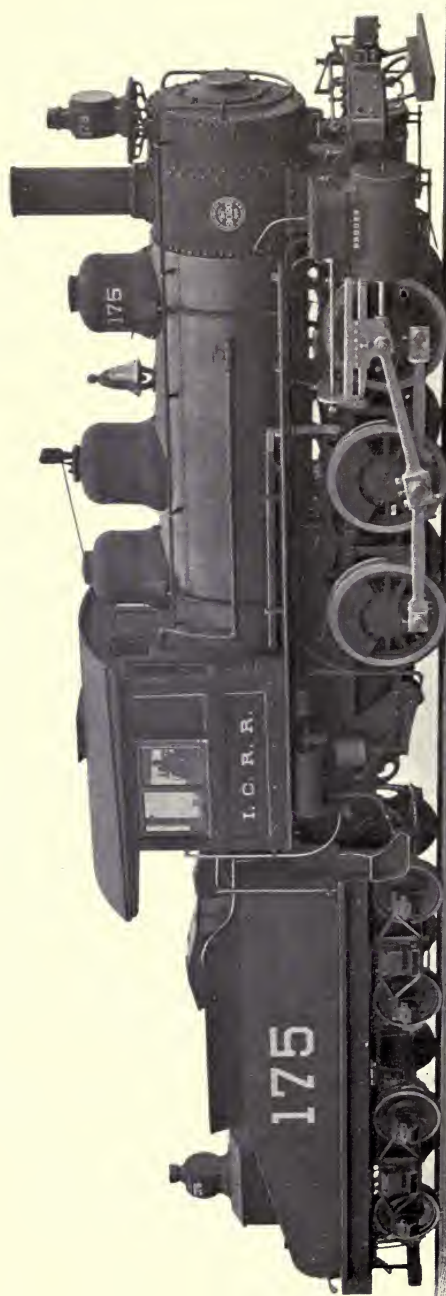
BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1899
 FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CODE WORD, QUOIF.
 TYPE, 6-WHEELED SWITCHER.
 SERIES, 682.
 CLASS, 19 H.

WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 3500 U. S. GALLONS AND 5 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
246	2"	14'-6 $\frac{1}{4}$ "	11'-3"	11'-3"	11'-3"	43'-8 $\frac{3}{4}$ "	79000	—	122700	—	122700			Long	80"	34 $\frac{1}{2}$ "
FLUES				WHEEL BASE			AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
170				Bituminous Coal		1856	145	18	2019	18.6	1.435	4'-8 $\frac{1}{2}$ "				

FOR HAULING CAPACITY SEE PAGE 290.

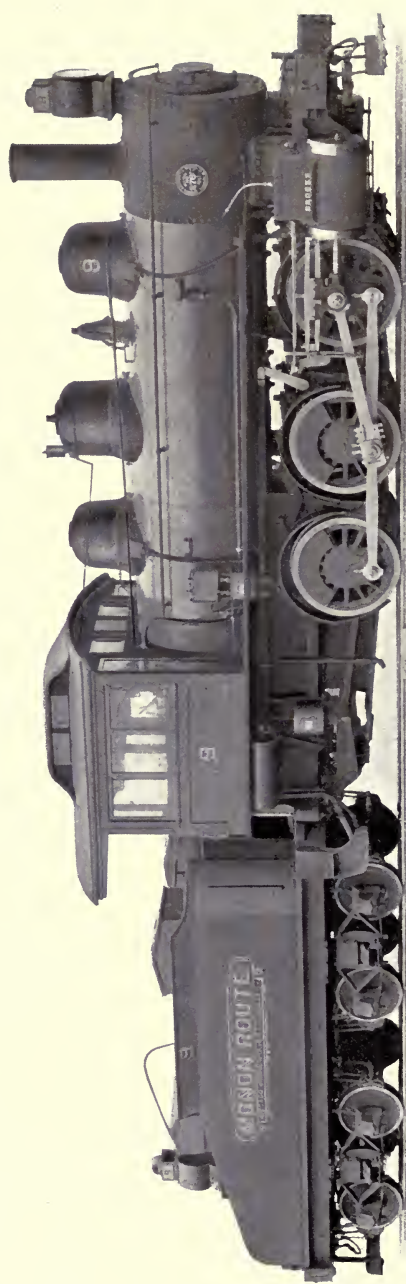


BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1898
FOR THE ILLINOIS CENTRAL RAILROAD.

CODE WORD, QUOIFFURE. SERIES, 667.
TYPE, 6-WHEELED SWITCHER. CLASS, 19 H.
WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 3000 U. S. GALLONS AND 4½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX		
TYPE	DIA.	STROKE	TENDER NO.	DIA.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH INCHES
Simple	19"	26"	8	33"	—	—	6	51"	—	—	Long, Sloping	113" 34½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
220	2"	10'-7 $\frac{1}{16}$ "	11'-0"	11'-0"	11'-0"	39'-3"	67000	—	114000	—	114000	
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES	
180	Bituminous Coal			1209	146	—	1355	26	1.435	4'-8½"		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1897

FOR THE CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY.
(Formerly L., N. A. & C.)

CODE WORD, QUOIN.

TYPE, 6-WHEELED SWITCHER.

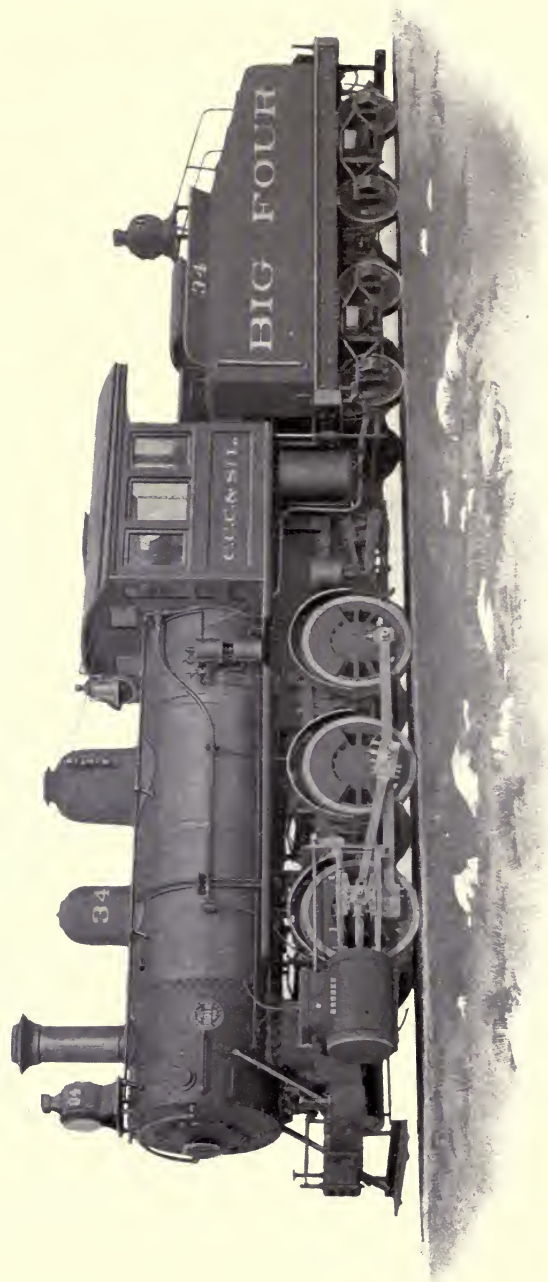
SERIES, 603.

CLASS, 19 H.

WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 3500 U. S. GALLONS AND 5 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TENDER DIA.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	LEADING NO.	DIA.	TYPE	LENGTH WIDTH
Simple	19"	24"	8	33"	—	—	6	50"	—	Rad. Stay, Straight top	96 $\frac{1}{2}$ " 32 $\frac{1}{2}$ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
208	2"	11'-0 $\frac{1}{8}$ "	11'-0"	11'-0"	11'-0"	41'-5"	70000	—	115500	—	115500
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				FLUES	FIRE BOX	ARCH PIPES	TOTAL	GRATE AREA			
KIND				FLUES	FIRE BOX	ARCH PIPES	TOTAL	GUAGE OF TRACK			
180	Bituminous Coal			1189	137	—	1326	21.2	1.435	4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1898

FOR THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY.

CODE WORD, QUOIT.

TYPE, 6-WHEELED SWITCHER.

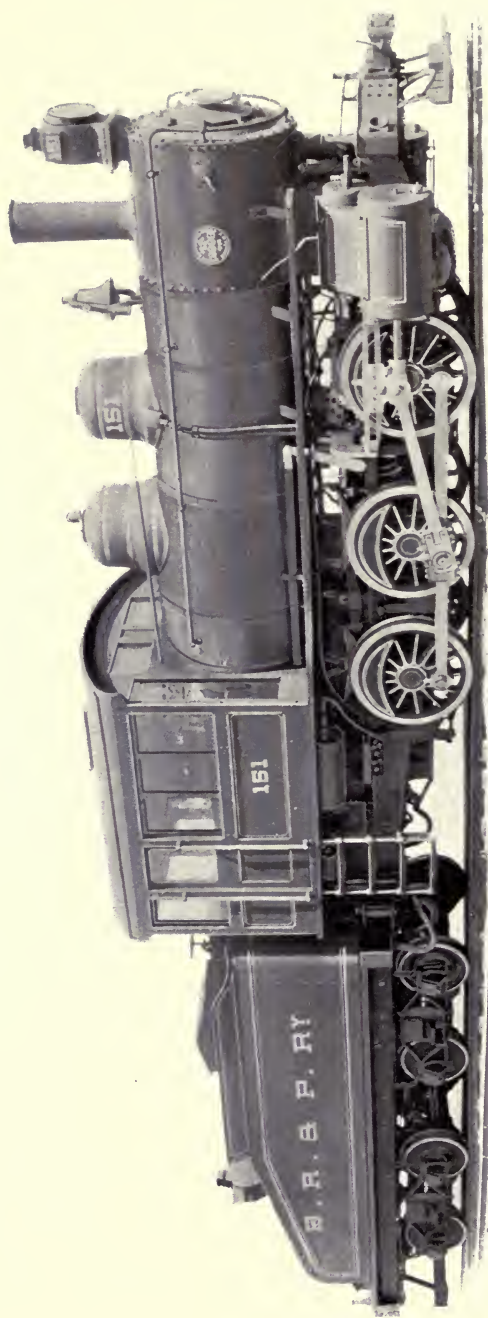
WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 3500 U. S. GALLONS AND 5 TONS FUEL.

SERIES, 635.

CLASS, 19 H.

CYLINDERS				WHEELS				BOILER		FIRE BOX		
TYPE	DIA.	STROKE	TENDER	TRAILING	COUPLED DRIVERS		LEADING	TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	NO.	DIA.	NO.	NO.					
Simple	19"	24"	8	33"	—	50"	—	Rad. Stay, Straight Top	60 ¹ / ₈ "	Long	103"	33 ³ / ₄ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
232	2"	11'-0"	11'-6"	11'-6"	11'-6"	39'-3"	70000	—	109000	—	109000	
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES	
160			Bituminous Coal	1326	145	—	1471	23.5	1.435	4'-8 ¹ / ₂ "		

FOR HAULING CAPACITY SEE PAGE 290

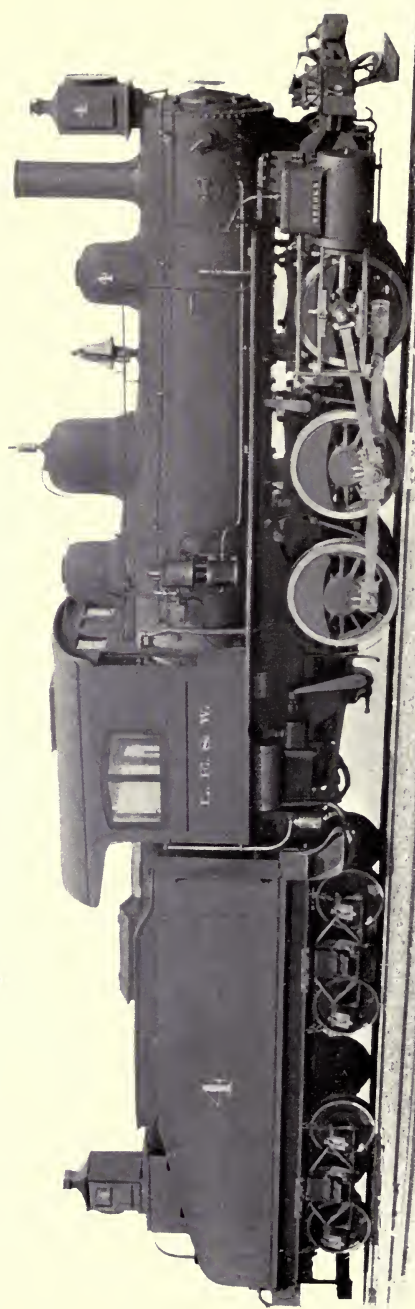


BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1898
FOR THE BUFFALO, ROCHESTER & PITTSBURG RAILWAY.

CODE WORD, QUOIX. SERIES, 662.
TYPE, 6-WHEELED SWITCHER. CLASS, 19 H.
WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 4000 U. S. GALLONS AND 5 TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
225	2"	11'-11 ¹ / ₈ "	11'-0"	11'-0"	11'-0"	40'-8"	75000	—		108000	—		108000		
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES	FEET	INCHES	
180				Bituminous Coal		1297	134	—		1431	21.7		1.435	4'-8 ¹ / ₂ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1899
FOR THE LAKE ERIE & WESTERN RAILROAD.

CODE WORD, QUOKE. SERIES, 689.
TYPE, 6-WHEELED SWITCHER. CLASS, 18 H.

WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 4000 U. S. GALLONS AND 4½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH WIDTH
Simple	18"	24"	8	—	—	6	50"	—	—	Crown Bar, Wagon Top	84" 33"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
213	2"	11'-1 $\frac{1}{8}$ "	11'-0"	11'-0"	11'-0"	40'-1"	76000	—	110600	—	110600
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
165	Bituminous Coal			1226.6	124	—	1350.6	18.6	1.435	4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE PEORIA & PEKIN UNION RAILWAY.

CODE WORD, QUOLLEG.
 TYPE, 6-WHEELED SWITCHER.

SERIES, 636.
 CLASS, 18 H.

WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 3100 U. S. GALLONS AND 3½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple		18"	24"	8	33"	—	—	6	52"	—	—	Improved Belpaire	56"	84"	33"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
190	2"	11'-1 $\frac{1}{8}$ "	11'-0"	11'-0"	11'-0"	38'-2"	65000	—	109000	—	109000				
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES				
165				Bituminous Coal	1098	122	—	1220	18.6	1.435	4'-8 $\frac{1}{2}$ "				

FOR HAULING CAPACITY SEE PAGE 290.



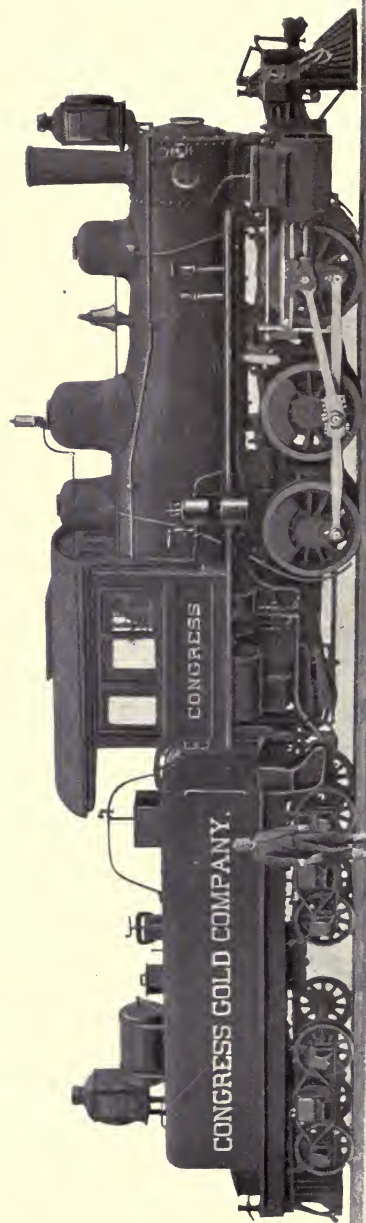
BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898

FOR THE ST. LOUIS NATIONAL STOCK YARDS.

CODE WORD, QUONDAM. SERIES, 678.
 TYPE, 6-WHEELED SWITCHER. CLASS, 18 H.
 WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 2500 U. S. GALLONS AND 4 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
200	2"	11'-1 $\frac{1}{8}$ "	11'-0"	11'-0"	11'-0"	38'-5"	62000	—	106000	—	106000			Long	84"	33"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
165				Bituminous Coal		1153	119	—	1272	18.7	1.435	4'-8 $\frac{1}{2}$ "				

FOR HAULING CAPACITY SEE PAGE 290.



OIL BURNING LOCOMOTIVE.

BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

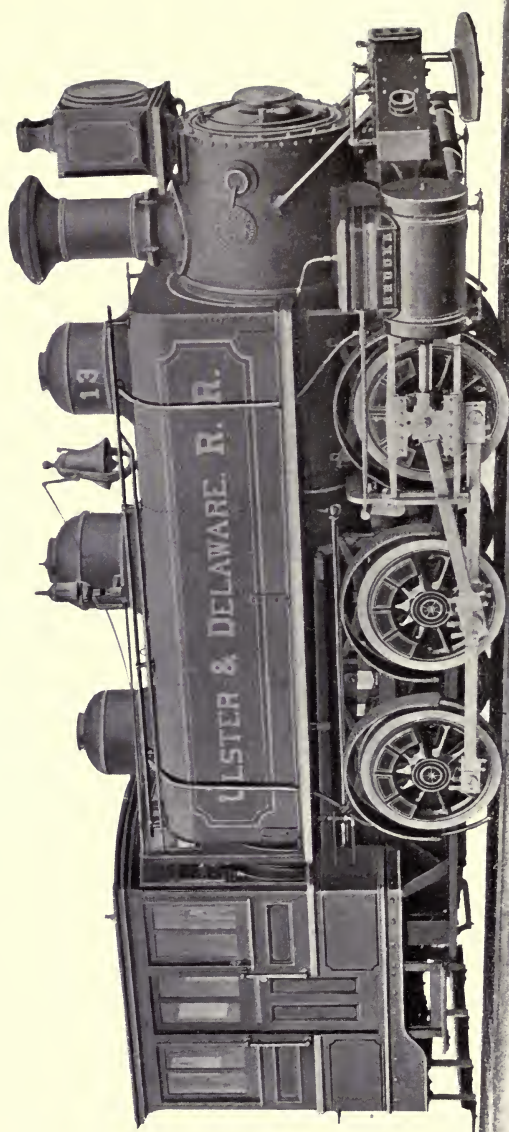
1896

FOR THE CONGRESS GOLD COMPANY.

CODE WORD, QUOPLIN. SERIES, 584.
 TYPE, 6-WHEELED SWITCHER. CLASS, 17 H.
 WITH 8-WHEELED TENDER TANK CAPACITY 3600 U. S. GALLONS AND 5 TONS FUEL (OIL).

CYLINDERS				WHEELS						BOILER		FIRE BOX		
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple	17"	24"	8	33"	—	—	6	51"	—	—	Crown Bar, Wagon Top	Long	78"	32"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
226	2"	11'-1½"	11'-0"	11'-0"	11'-0"	40'-8"	86000	—	112000	—	112000			
BOILER PRESSURE.			FUEL			HEATING SURFACE, Sq. Ft.		GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
180			Crude Petroleum	1308	129	—	1437	16.8	1.435	4'-8½"				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1885

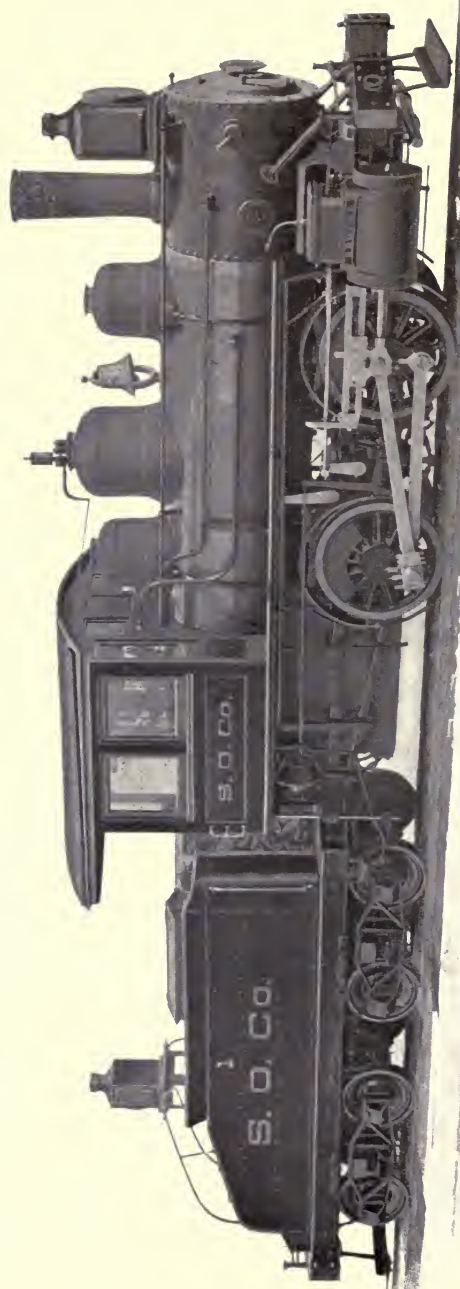
FOR THE ULSTER & DELAWARE RAILROAD.

CODE WORD, QUOPPET.
 TYPE, 6-WHEELED SADDLE TANK SWITCHER.
 SERIES, 208.
 CLASS, 17 H. T.

TANK CAPACITY 1000 U. S. GALLONS AND 1 TON FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		DIA.	TYPE	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple		17"	24"	—	—	—	—	6	44"	—	—	Crown Bar, Straight Top		96"	34"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH		DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
143	2"	9'-8"		10'-0"	10'-0"	10'-0"	—	—	—	84000	—	84000			
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
135				Anthracite Coal		717.4	74	—	791.4	22.6	1.435	4'-8½"			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1891

FOR THE STANDARD OIL COMPANY.

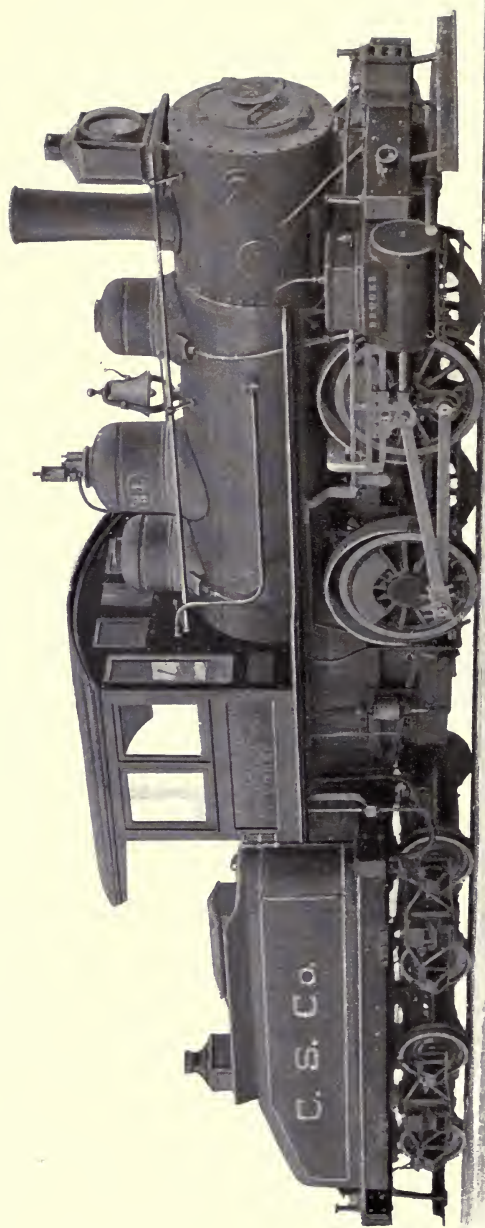
CODE WORD, QUORAM.
TYPE, 4-COUPLED SWITCHER.

SERIES, 421.
CLASS, 17 E.

WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 2500 U. S. GALLONS AND 4 TONS FUEL.

CYLINDERS				WHEELS								BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
186	2"	11'-1 $\frac{1}{16}$ "	7'-0"	7'-0"	7'-0"	34'-3"	62000	—	78000	—	78000			Deep	72"	34"	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.						GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES		FIRE BOX		ARCH PIPES		TOTAL		SQUARE FEET		METRES	
165				Bituminous Coal		1071		102		—		1173		16.3		1.435	
																4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

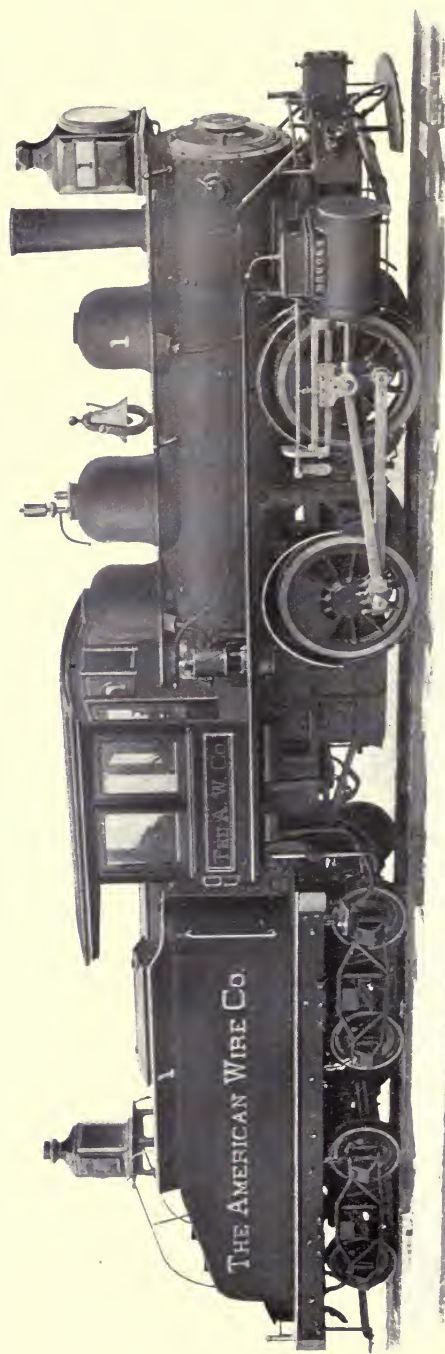
1893
FOR THE CARNEGIE STEEL COMPANY.

CODE WORD, QUOTA. SERIES, 490.
TYPE, 4-WHEELED SWITCHER. CLASS, 16 E.

WITH 8-WHEELED TENDER, SLOPING BACK TANK, CAPACITY 2500 U. S. GALLONS AND 4 TONS FUEL.

CYLINDERS			WHEELS								BOILER			FIRE BOX		
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple	16"	24"	8	30"	—	—	4	50"	—	—	Rad. Stay, Straight Top	52"	Deep	66"	34½"	
FLUES			WHEEL BASE					AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
164	2"	11'-1"	7'-0"	7'-0"	7'-0"	35'-6"	60000	—	72500	—	72500					
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.					GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
150			Bituminous Coal		956	95	—	1051	15.2	1.435	4'-8½"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1890

FOR THE AMERICAN WIRE COMPANY.

CODE WORD, QUOTANT.

TYPE, 4-WHEELED SWITCHER.

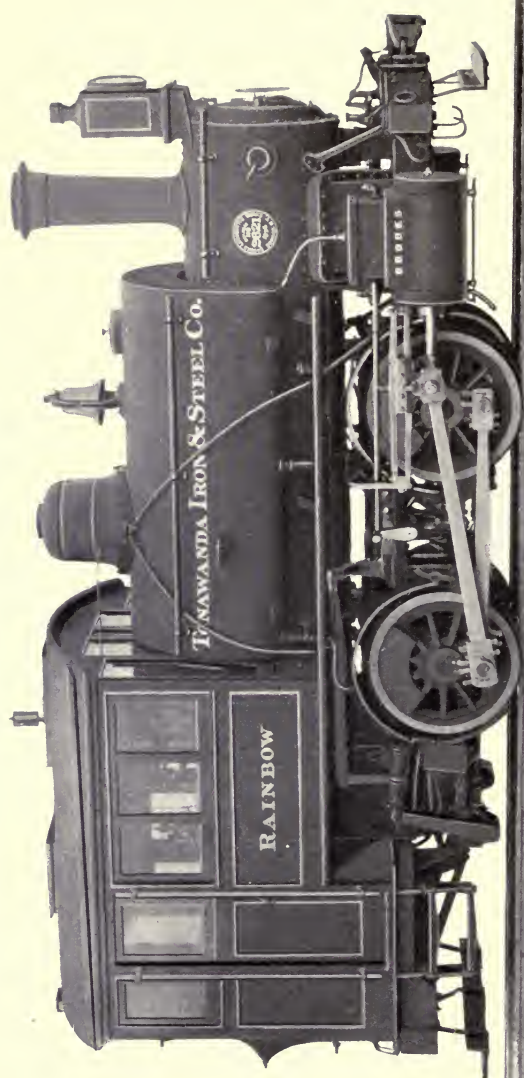
SERIES, 381.

CLASS, 16 E.

WITH 8-WHEELED TENDER, SLOPING BACK, TANK CAPACITY 2500 U. S. GALLONS AND 4 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING	COUPLED DRIVERS		LEADING		TYPE	DIA.
			NO.	DIA.		NO.	DIA.	NO.	DIA.		
Simple	16"	22"	8	—	—	4	50"	—	—	Deep	46"
											48"
											34½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER		TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS
						NO.	DIA.				
126	2"	10'-11"	7'-0"	7'-0"	7'-0"	23'-10"		62000	—	58200	—
											58200
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES		FIRE BOX	ARCH PIPES		TOTAL	SQUARE FEET
					NO.	DIA.		NO.	DIA.		
150				Bituminous Coal	715		63	—	—	778	11.1
											1.435
											4'-8½"
BOILER PRESSURE				GAUGE OF TRACK				FEET INCHES			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				METRES				FEET INCHES			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				METRES				FEET INCHES			

FOR HAULING CAPACITY SEE PAGE 290.

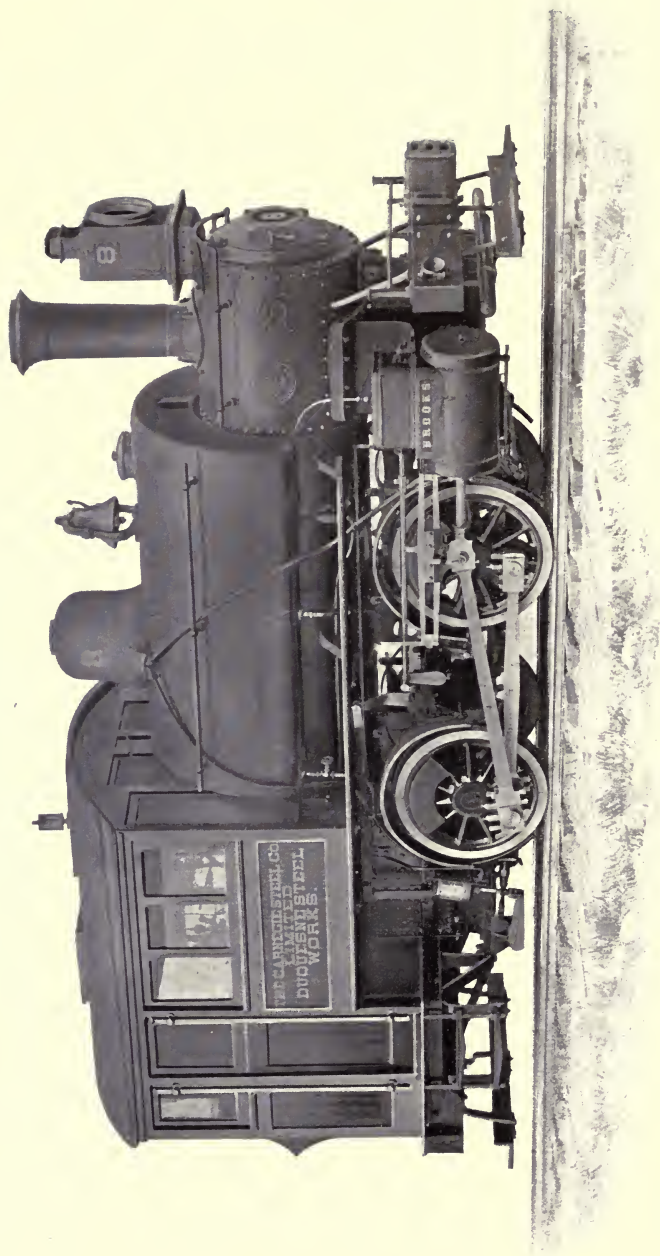


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1895
 FOR THE TONAWANDA IRON & STEEL COMPANY.

CODE WORD, QUOTH.
 TYPE, 4-WHEELED SADDLE TANK SWITCHER.
 SERIES, 564.
 CLASS, 18 E. T.
 TANK CAPACITY 900 U. S. GALLONS AND 1½ TONS FUEL.

CYLINDERS			WHEELS								BOILER		FIRE BOX						
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH				
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.									
Simple	16"	24"	—	—	—	—	—	4	48"	—	—	Crown Bar, Straight Top	48"	Deep	48"	35"			
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS												
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER		TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE							
126	2"	10'-10 1/16"	7'-0"	7'-0"	7'-0"	—		—	—	76000	—	76000							
BOILER PRESSURE			FUEL			HEATING SURFACE, Sq. Ft.					GRATE AREA		GAUGE OF TRACK						
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES		FIRE BOX		ARCH PIPES		TOTAL		SQUARE FEET		METRES		FEET INCHES		
165			Bituminous Coal			711		67		—		778		11.3		1.435		4'-8 1/2"	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1895
FOR THE CARNEGIE STEEL COMPANY.

CODE WORD, QUOTIDIAN. SERIES, 543.
TYPE, 4-WHEELED SADDLE TANK SWITCHER. CLASS, 16 E. T.

TANK CAPACITY 900 U. S. GALLONS AND $1\frac{3}{4}$ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		DIA.	TYPE	LENGTH WIDTH			
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple		16"	24"	—	—	—	—	4	48"	—	—	Crown Bar, Straight Top		48"	34½"		
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
126	2"	10'-10"	7'-0"	7'-0"	7'-0"	—	—	—	76000	—	76000						
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.						GRATE AREA				GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
165				Bituminous Coal	711	67	—	778	11.1	1.435	4'-8½"						

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1892

FOR THE STUDERAKER BROS MFG COMPANY.

CODE WORD, QUOTIENT.

TYPE, 4-WHEELED SADDLE TANK SWITCHER.

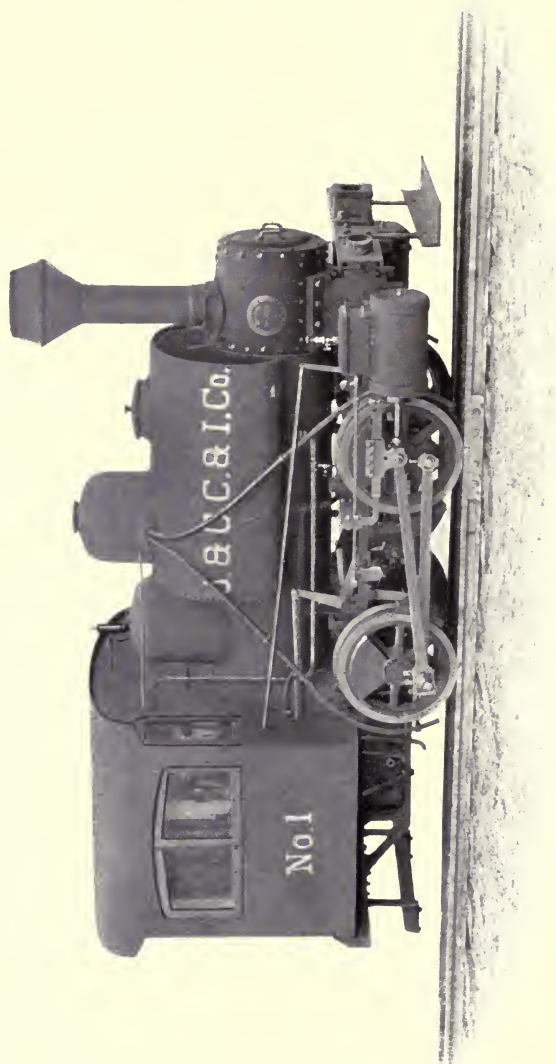
SERIES, 451.

CLASS, 14 E. T.

TANK CAPACITY 700 U. S. GALLONS AND 1 TON FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple		14"	22"	—	—	—	—	4	42½"	—	—	Crown Bar, Straight	42"	35"	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
150	2"	10'-10"	7'-0"	7'-0"	7'-0"	—	—	—	60000	—	60000				
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
120				Bituminous Coal		596	64	—	660	9.7	1.435	4'-8½"			

FOR HAULING CAPACITY SEE PAGE 290.



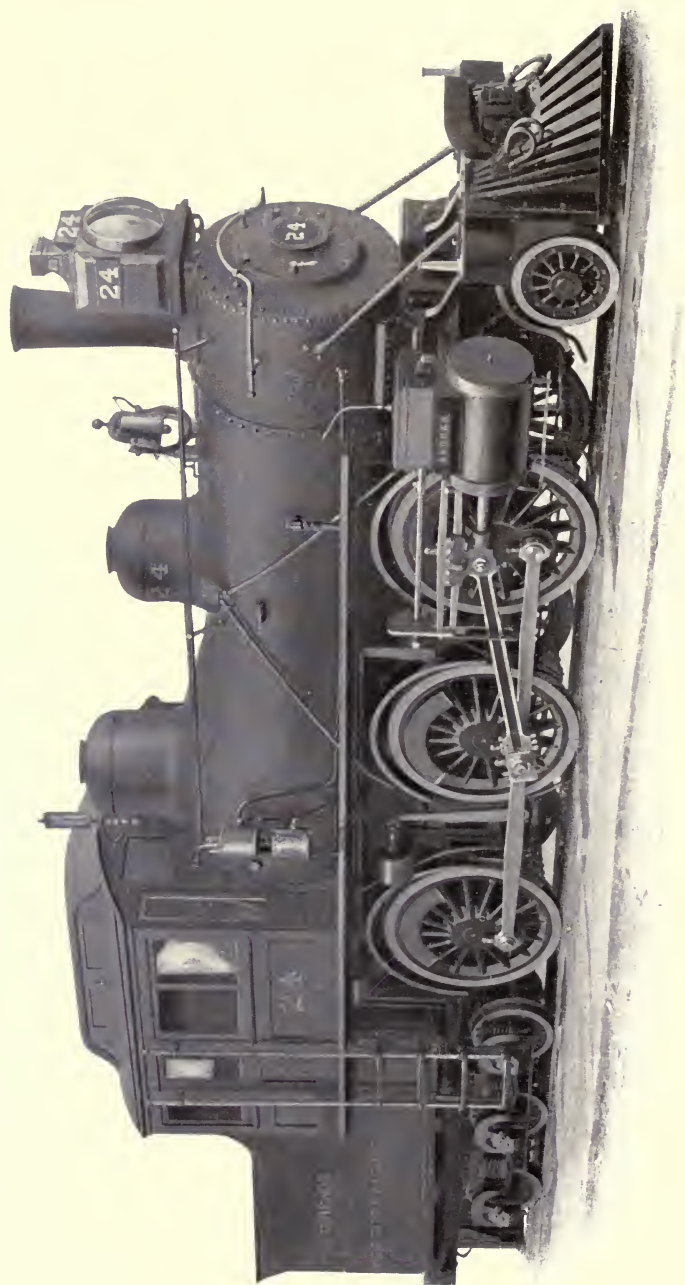
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1897
FOR THE JEFFERSON & CLEARFIELD COAL & IRON COMPANY.

CODE WORD, QUOTIX.
TYPE, 4-WHEELED SADDLE TANK SWITCHER.
SERIES, 598.
CLASS, 8 E. T.

TANK CAPACITY 200 U. S. GALLONS AND $\frac{1}{2}$ TON FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple		8"	12"	—	—	—	—	4	30"	—	—	Direct Stay Straight Top	26"	30 $\frac{1}{2}$ "	38"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
50	1 $\frac{1}{2}$ "	7'-2 $\frac{7}{8}$ "	4'-8"	4'-8"	4'-8"	—	—	—	23000	—	23000				
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH TUBES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
180				Bituminous Coal		141	28	—	169	7.5	1.435	4'-8 $\frac{1}{2}$ "			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1893

FOR THE CHICAGO & NORTHERN PACIFIC RAILROAD.

CODE WORD, QUOTOON.

SERIES, 487.

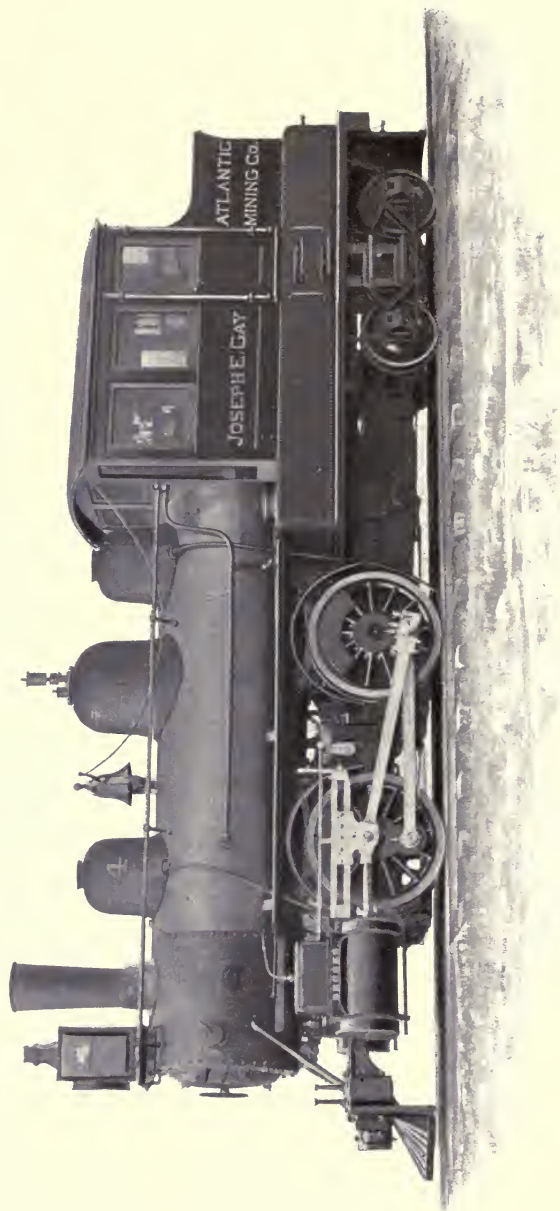
TYPE, 6-COUPLED DOUBLE ENDER TANK ENGINE.

CLASS, 18 B. R. X.

REAR TANK, CAPACITY 2600 U. S. GALLONS AND 4½ TONS FUEL.

CYLINDERS				WHEELS								BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		DIA.	TYPE	LENGTH	WIDTH
Simple		18"	24"	—	—	6	30"	6	63"	2	30"	Crown Bar, Wagon Top		58"	Long, Sloping	102"	33"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
250	2"	11'-1"	15'-0"	15'-0"	35'-9"	—	—	48000	102000	16000	166000						
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
180				Bituminous Coal		1453	144	23	1620	22.6	1.435	4'-8½"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1890
 FOR THE ATLANTIC MINING COMPANY.

CODE WORD, QUOTUM.

SERIES, 394.

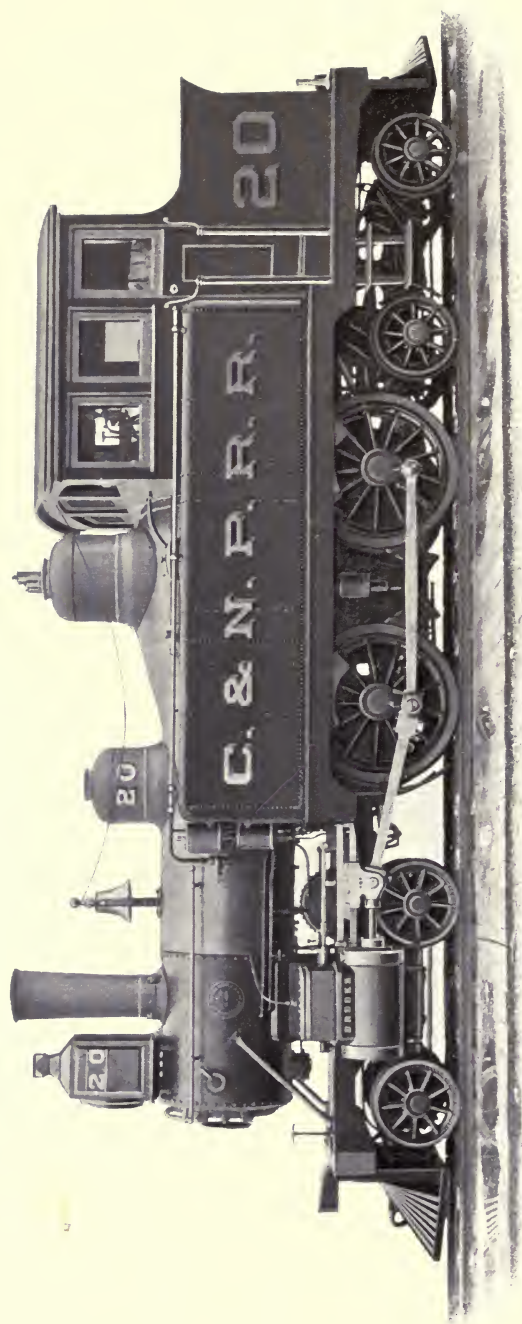
TYPE, 4-COUPLED, "FORNEY," TANK ENGINE.

CLASS, 16 E. Q. X.

REAR TANK, CAPACITY 1120 U. S. GALLONS AND 3 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
156	2"	11'-1 $\frac{1}{16}$ "	6'-6"	6'-6"	22'-0"	—	—	22000	68800	—	90800					
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
165				Bituminous Coal		899	91	—	990	16.3	1.244	4'-1"				

FOR HAULING CAPACITY SEE PAGE 290.

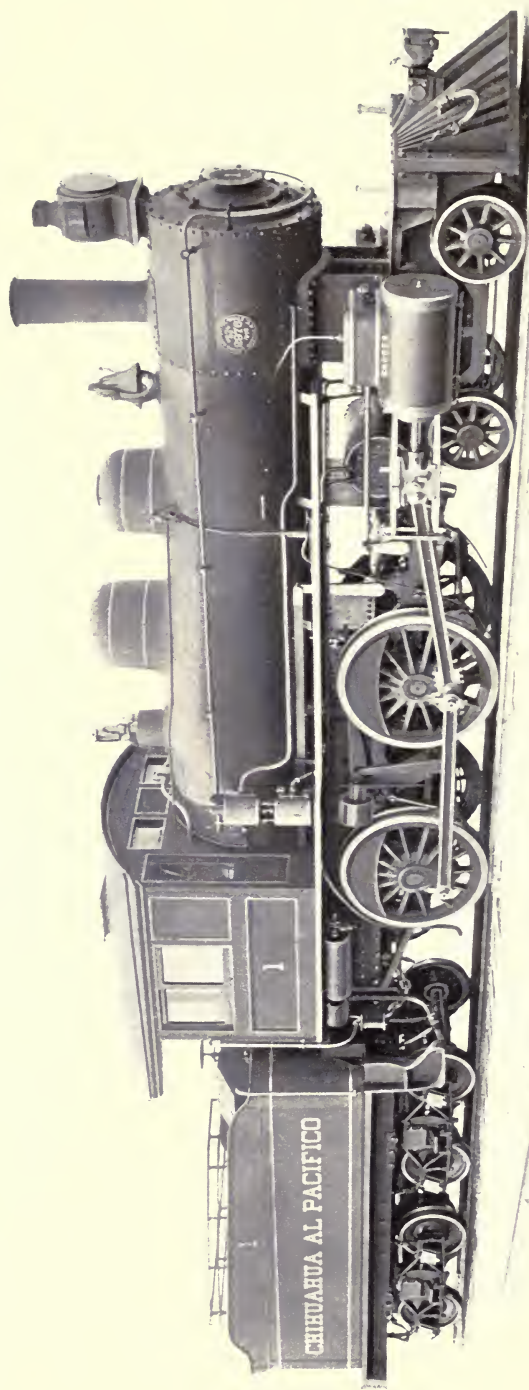


BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1890
FOR THE CHICAGO & NORTHERN PACIFIC RAILROAD.

CODE WORD, QUOTUOR.
TYPE, 4-COUPLED, DOUBLE ENDER, TANK ENGINE.
SIDE TANKS, CAPACITY 1600 U. S. GALLONS AND 3 TONS FUEL.
SERIES, 395.
CLASS, 15 A. Q. Y.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	15"	22"	—	—	4	30	4	57"	4	30"	Crown Bar, Wagon Top	46"	Long, Sloping	84"	34"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
140	2"	9'-0"	7'-0"	7'-0"	28'-6"	—	—	21000	56000	23000	100000				
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
165			Coke or Coal	654	112	—	766	19.6	1.435	4'-8½"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U. S. A.
1898

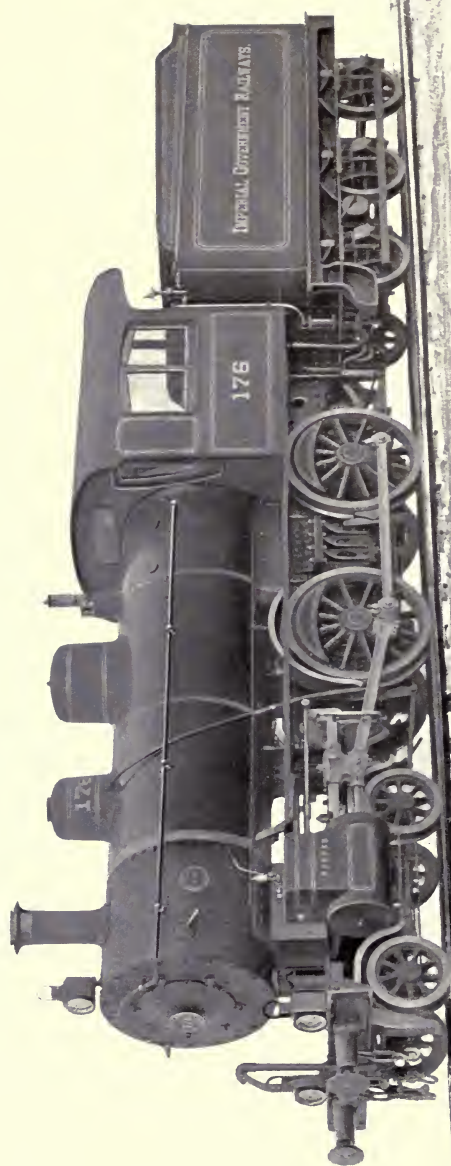
FOR THE CHIHUAHUA & PACIFIC RAILROAD.

CODE WORD, YABYAN. SERIES, 659.
TYPE, 8-WHEELED PASSENGER. CLASS, 18 A.

WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 8 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
225	2"	11'-7 $\frac{1}{8}$ "	8'-0"	8'-0"	22'-9"	48'-6"	80000	—	68500	37000	105500				
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
180				Oak or Mesquite				1356	134	—	1490	21.8	1.435	4'-8 $\frac{1}{2}$ "	
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND				FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
180				Oak or Mesquite				1356	134	—	1490	21.8	1.435	4'-8 $\frac{1}{2}$ "	

FOR HAULING CAPACITY SEE PAGE 290.



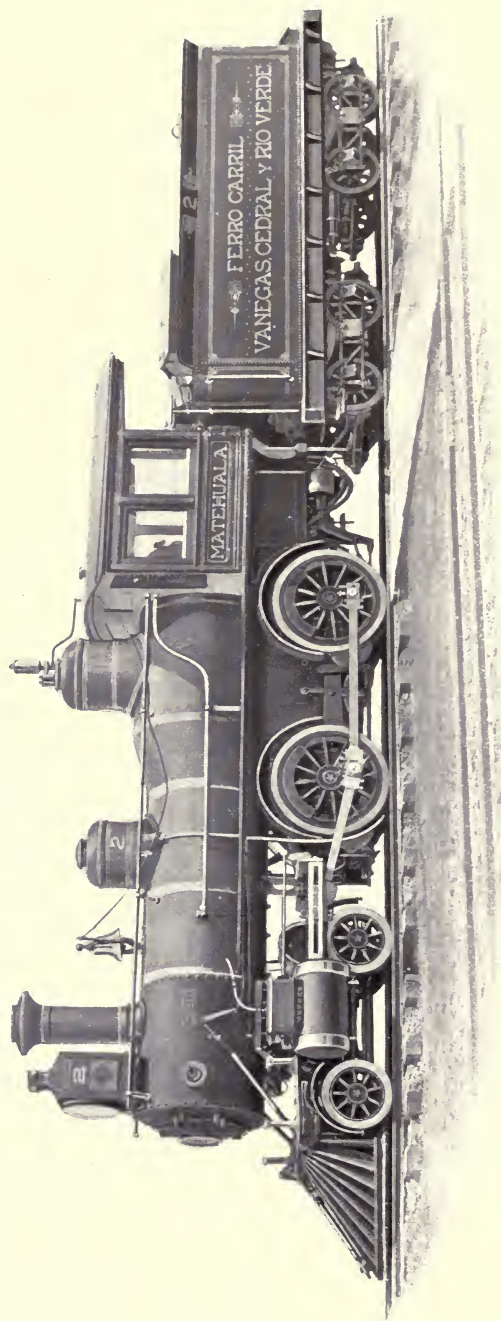
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1897
FOR THE IMPERIAL GOVERNMENT RAILWAYS,
JAPAN.

CODE WORD, YACCA. SERIES, 626.
TYPE, 8-WHEELED PASSENGER. CLASS, 15 A.

WITH 6-WHEELED TENDER TANK CAPACITY 2400 U. S. GALLONS AND 3½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX		
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.			
Simple		15"	22"	6	35½"	—	—	4	54"	4	27½"	Rad. Stay, Straight Top	Long, Wide, 78" Sloping	29½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
210	1¾"	9'-7-11⁄16"	7'-0"	7'-0"	19'-4"	38'-10½"	52000	—	50400	24100	74500			
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES	
160				Bituminous Coal, Japanese		915	89.9	—	1004.9	15.2	1.067	3'-6"		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1890

FOR THE VANEGAS, CEDRAL, & RIO VERDE RAILROAD
OF MEXICO.

CODE WORD, YACHT.

TYPE, 8-WHEELED PASSENGER.

SERIES, 366.

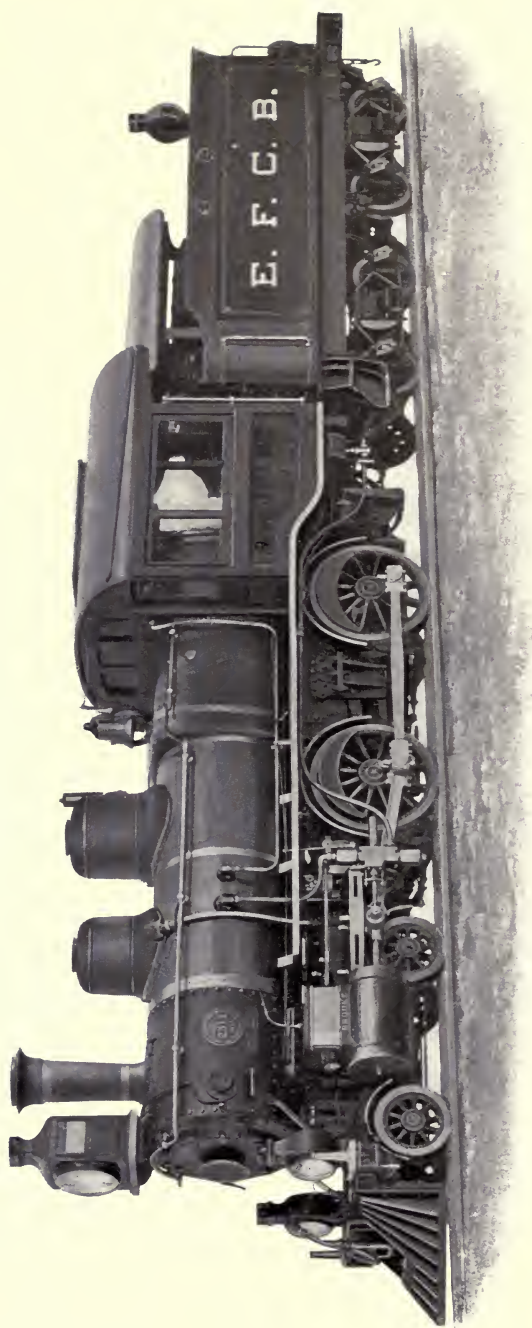
CLASS, 15 A.

WITH 8-WHEELED TENDER

TANK CAPACITY 2400 U. S. GALLONS AND 5 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX			
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	15"	20"	8	28"	—	—	4	50"	4	28"	Crown Bar, Wagon Top	48"	Long, Wide, Sloping	84"	24"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
154	2"	9'-0"	7'-0"	7'-0"	18'-2"	41'-0"	55000	—	48000	17000	65000				
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES		FIRE BOX		ARCH PILES		TOTAL	SQUARE FEET		METRES	FEET INCHES
150			Bituminous Coal		718		79		—		797	13.5		.915	3'-0"

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1895
 FOR THE CENTRAL RAILWAY
 OF BRAZIL.

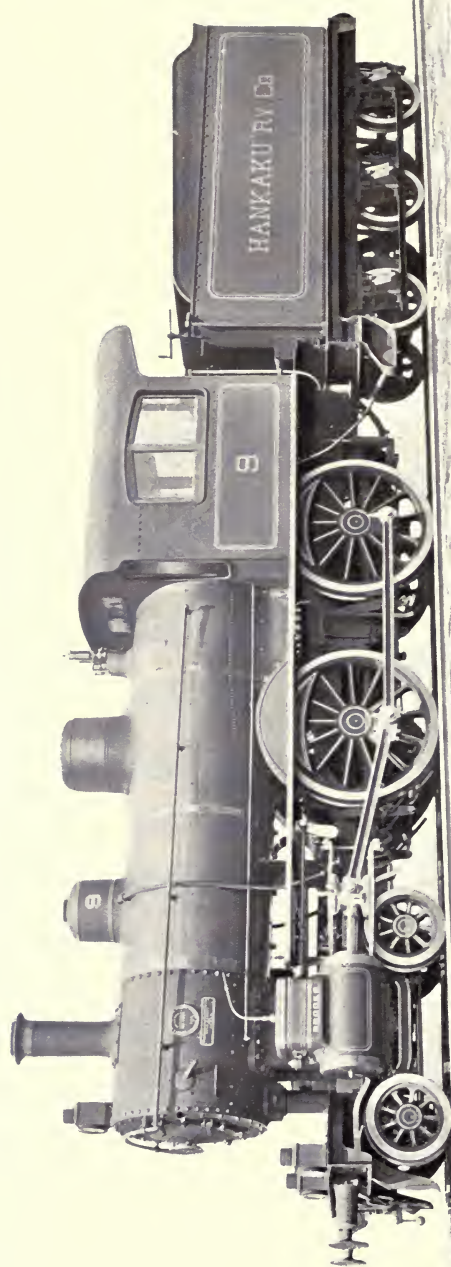
CODE WORD, YAFFLE.
 TYPE, 8-WHEELED PASSENGER.

SERIES, 536.
 CLASS, 14 A.

WITH 8-WHEELED TENDER TANK CAPACITY 2400 U. S. GALLONS AND 5 TONS FUEL.

CYLINDERS			WHEELS						BOILER		FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH		
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple		14"	18"	8	27½"	—	—	4	46"	4	25½"	Improved Belpaire	50½"	Long, Wide, Sloping	84"	27½"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
155	2"	9'-0⅜"	7'-0"	7'-0"	18'-2"	42'-0"	58000	—	50000	24000	74000					
BOILER PRESSURE			FUEL			HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES						
165			Cardiff Coal	727	100	—	827	15.4	1.000	3'-3⅜"						

FOR HAULING CAPACITY SEE PAGE 290.



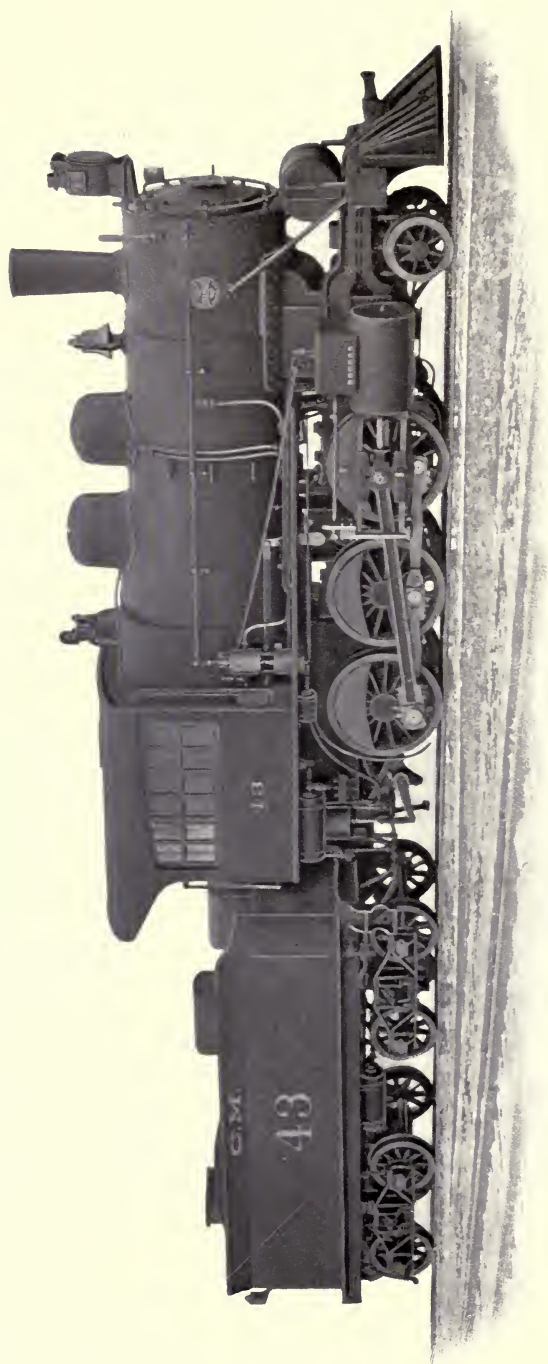
BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE HANKAKU RAILWAY COMPANY
 OF JAPAN.

CODE WORD, YAGER. SERIES, 665.
 TYPE, 8-WHEELED PASSENGER. CLASS, 14 A.

WITH 6-WHEELED TENDER TANK CAPACITY 2400 U. S. GALLONS AND 5 TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX		
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple	14"	24"	6	33½"	—	—	4	60"	4	27½"	Rad. Stay, Wagon Top	Long, Wide, Sloping	70"	29½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
192	1¾"	9'-0"	7'-0"	7'-0"	18'-8"	37'-6"	45000	—	47000	21000	68000			
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
160				Bituminous Coal	785	76	—	861	14.0	1.067	3'-6"			

FOR HAULING CAPACITY SEE PAGE 290.

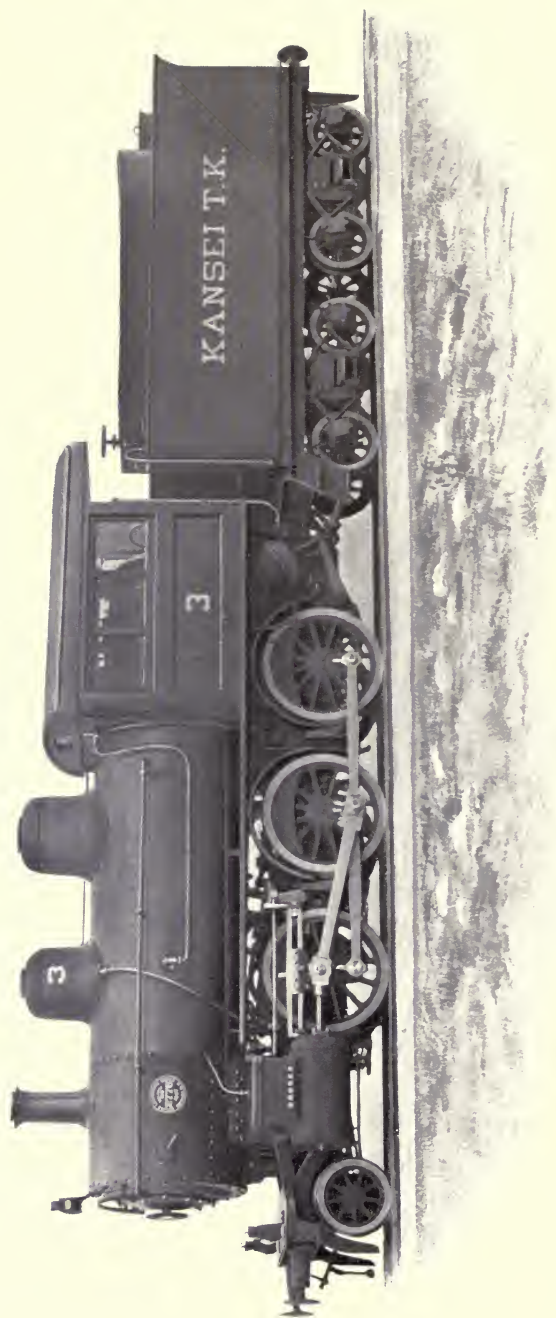


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U. S. A.
 1899
 FOR THE MEXICAN CENTRAL RAILWAY.

CODE WORD, YAKIN. SERIES, 676.
 TYPE, MOGUL FREIGHT. CLASS, 20 B.
 WITH 8-WHEELED TENDER TANK CAPACITY 4500 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING	TYPE	LENGTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.	WIDTH
Simple	20"	26"	8	34½"	—	—	6	55"	2	28½"	97"
										Improved Belpaire	38½"
										70"	Long, Wide
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
320	2"	11' - 7½"	10'-0"	10'-0"	18'-1"	46'-4½"	91300	—	132000	24300	156300
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES
180			Bituminous Coal		1923	165	—	2088	24.6	1.435	4' - 8½"

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE KANSEI RAILWAY
 OF JAPAN.

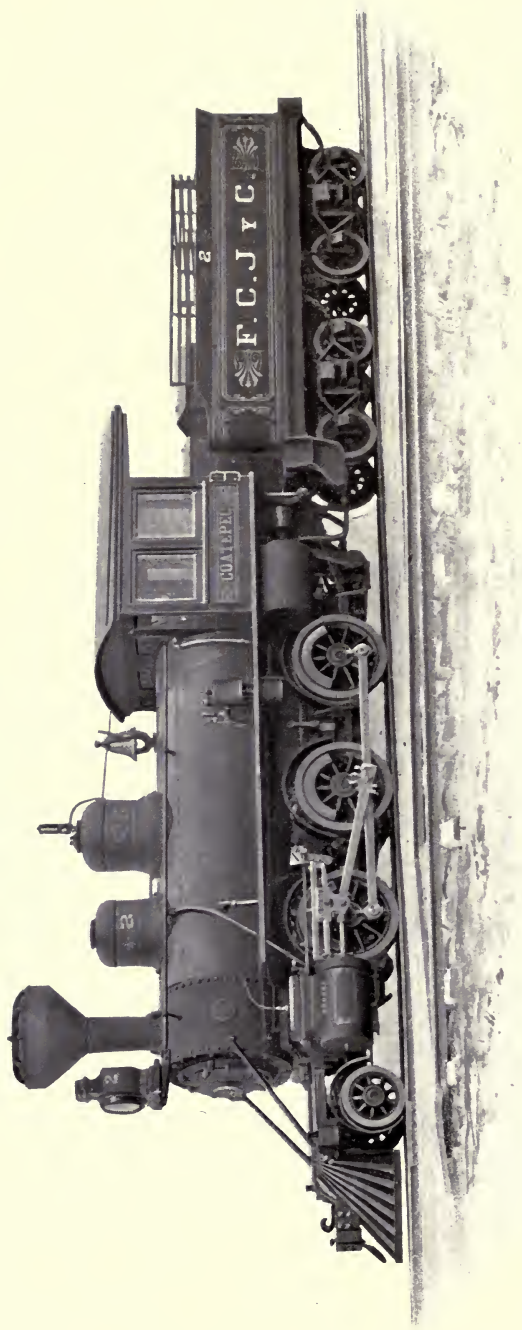
CODE WORD, YAKSHA.
 TYPE, MOGUL FREIGHT.

SERIES, 612.
 CLASS, 16 B.

WITH 8-WHEELED TENDER TANK CAPACITY 2700 U. S. GALLONS AND 5½ TONS FUEL.

CYLINDERS			WHEELS						BOILER		FIRE BOX			
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple	16"	22"	8	27½"	—	—	6	48"	2	27½"	Rad. Stay, Straight Top	56"	84"	29"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
202	2"	9'-4"	10'-4"	10'-4"	17'-4"	38'-0"	58000	—	12880	70000	82880			
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
165			Bituminous Coal		978.8	95.2	—	1074	16.4	1.067	3'-6"			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1897

FOR THE JALAPA & CORDOVA RAILWAY COMPANY
OF MEXICO.

CODE WORD, YAKSTERN.

TYPE, MOGUL FREIGHT.

SERIES, 623.

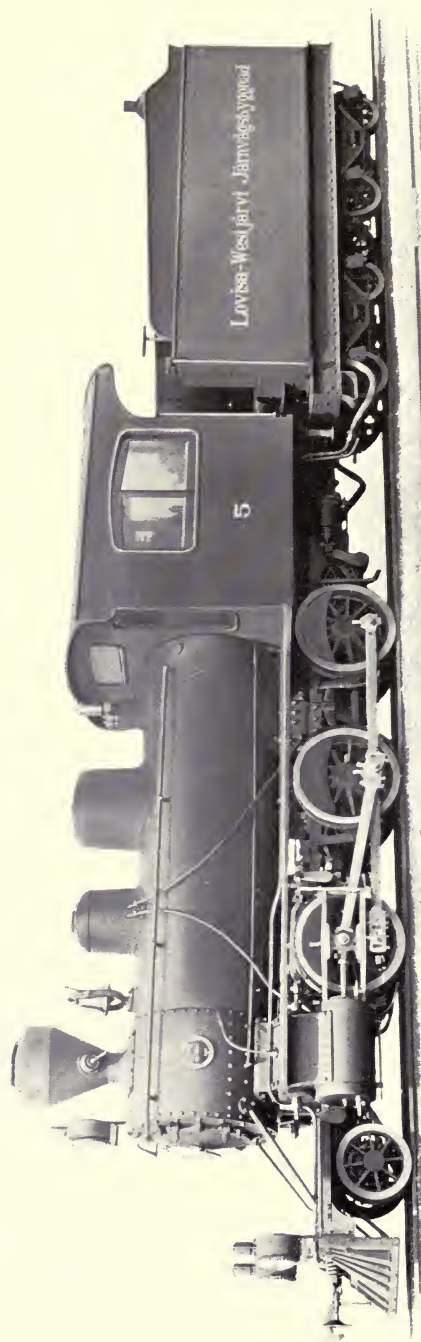
CLASS, 14 B.

WITH 8-WHEELED TENDER

TANK CAPACITY 1700 U. S. GALLONS AND 1½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX				
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple		14"	20"	8	28"	—	—	6	42"	2	26"	Rad. Stay, Straight Top		Long, Wide	84"	24"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
148	2"	8'-2"	10'-4"	10'-4"	16'-10"	40'-3"	50000	—	56000	7800	63800					
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.						GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
135				Wood	635	83	—	718	13.5	.915	3'-0"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1899
 FOR THE LOVISA-WESIJARVI RAILWAY
 OF FINLAND.

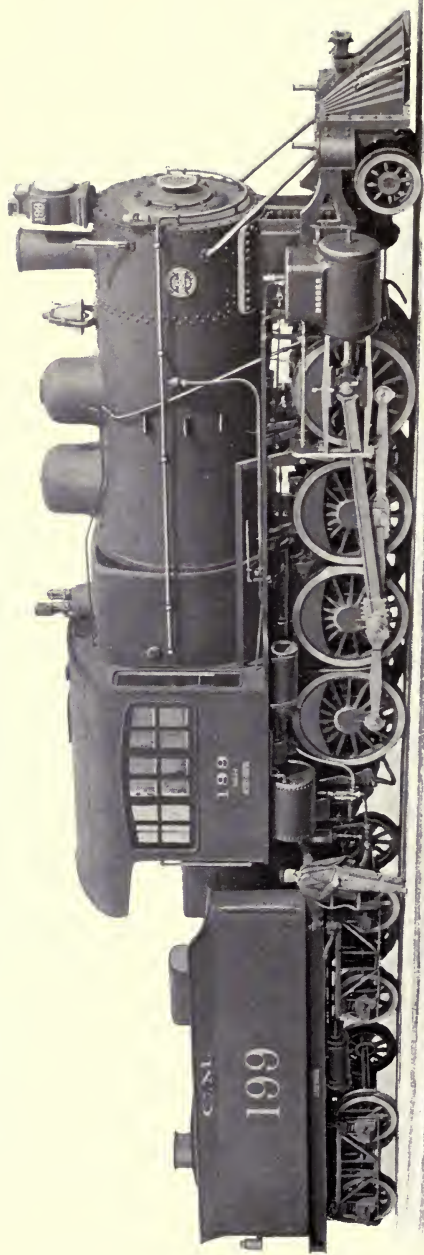
CODE WORD, YAKTAM.
 TYPE, MOGUL FREIGHT.

SERIES, 691.
 CLASS, 12½ B.

WITH 8-WHEELED TENDER TANK CAPACITY 2500 U. S. GALLONS AND 6 TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX							
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		DIA.	TYPE		LENGTH	WIDTH	
Simple Piston Valve		12½"	18"	8	24½"	—		6		37"	2	24½"	Rad. Stay, Straight Top		45"	Long, Wide		91"	19"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS											
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE								
120	2"	8'-2"	10'-0"	10'-0"	16'-0"	40'-0"	46297	—		43000	7717	50717							
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK							
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET		METRES	FEET	INCHES						
150				Coal or Wood	507	78	—		585	12.2		0.75	2'-5½"						

FOR HAULING CAPACITY SEE PAGE 290.



BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1897

FOR THE MEXICAN CENTRAL RAILWAY.

CODE WORD, YAMMA.

TYPE, CONSOLIDATION FREIGHT.

WITH 8-WHEELED TENDER

TANK CAPACITY 4500 U. S. GALLONS AND 8½ TONS FUEL.

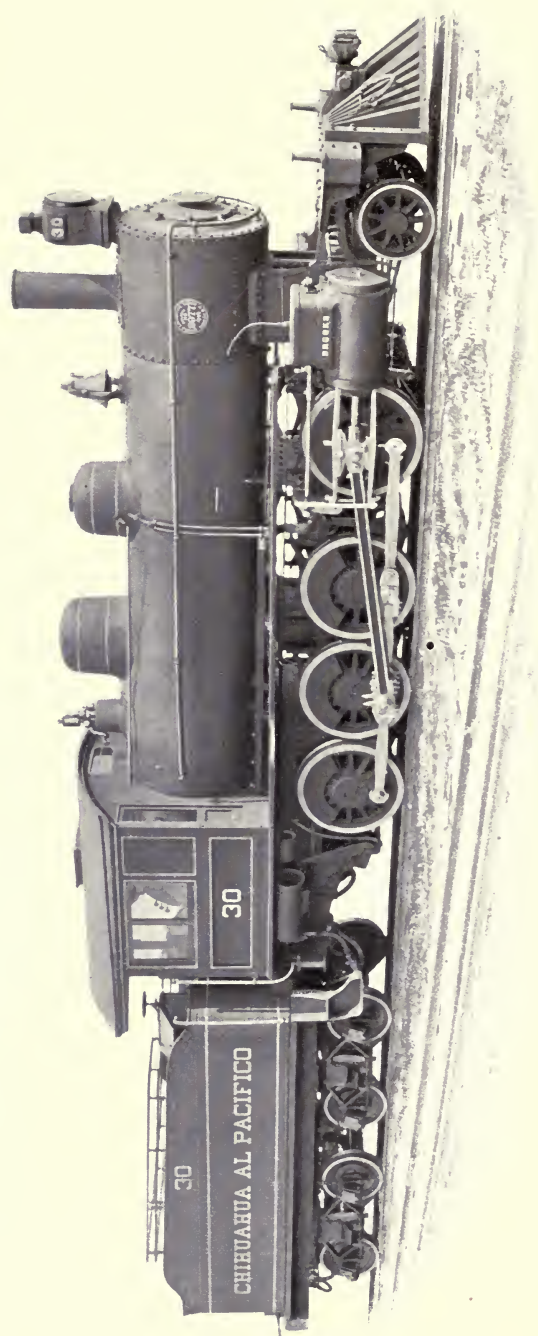
SERIES, 618.

CLASS, 21 C.



CYLINDERS				WHEELS						BOILER		FIRE BOX						
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH		
NO.			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.								
Simple			21"	26"	8	34 $\frac{1}{2}$ "	—	—	8	57"	2	28 $\frac{1}{2}$ "	Improved Belpaire		74"	Long, Wide	120"	37 $\frac{3}{4}$ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS										
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE							
374	2"	11'-1 $\frac{5}{16}$ "	15'-0"	15'-0"	23'-5"	50'-9 $\frac{1}{4}$ "	90000	—	160000	20000	180000							
BOILER PRESSURE			FUEL		HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK							
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES							
180			Bituminous Coal	2140	204	—	2344	31.45	1.435	4'-8 $\frac{1}{2}$ "								

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1898

FOR THE CHIHUAHUA & PACIFIC RAILROAD
OF MEXICO.

CODE WORD, YAMPO.

TYPE, CONSOLIDATION FREIGHT.

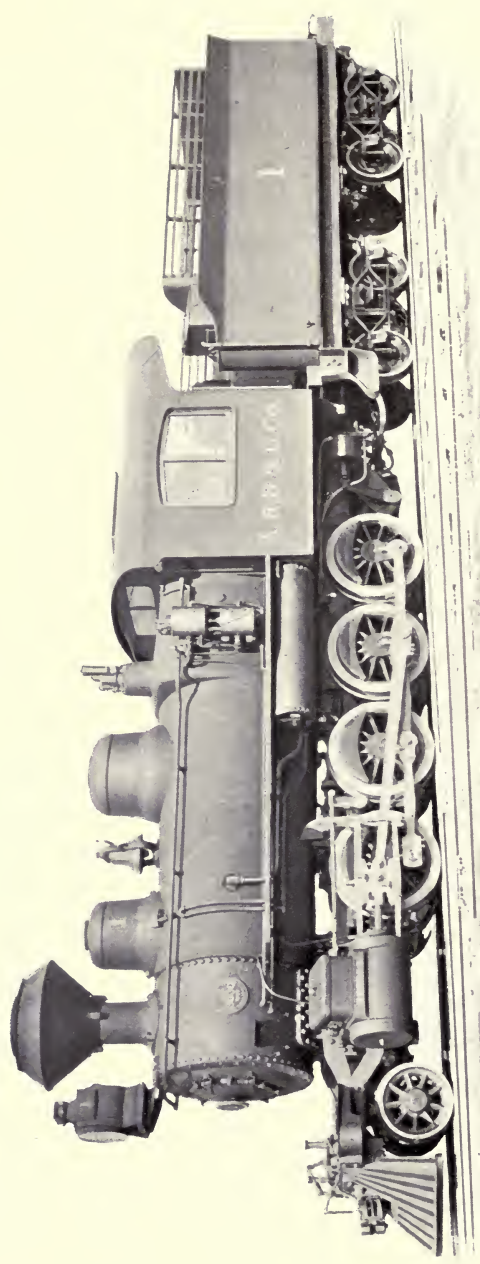
SERIES, 660.

CLASS, 18 C.

WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 10 TONS FUEL.

CYLINDERS			WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING	
			NO.	DIA.	NO.	DIA.	NO.	DIA.	TYPE	DIA.
Simple	18"	26"	8	33"	—	—	8	50"	2	30"
									Rad. Stay, Wagon Top	58"
									Long	108"
										33"
FLUES			WHEEL BASE			AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	TOTAL ENGINE
232	2"	13'-10"	14'-6"	14'-6"	22'-0"	47'-0"	80000	—	116000	130000
BOILER PRESSURE			FUEL			HEATING SURFACE, SQ. FT.		GRATE AREA		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND			FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET
180			Oak or Mesquite			1657	150	—	1807	24.3
										1.435
										4'-8½"
										FEET INCHES

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U. S. A.

1898

FOR THE AMERICAN RAILROAD & LUMBER COMPANY
OF MEXICO.

CODE WORD, YAPOCK.

SERIES, 644.

TYPE, CONSOLIDATION FREIGHT.

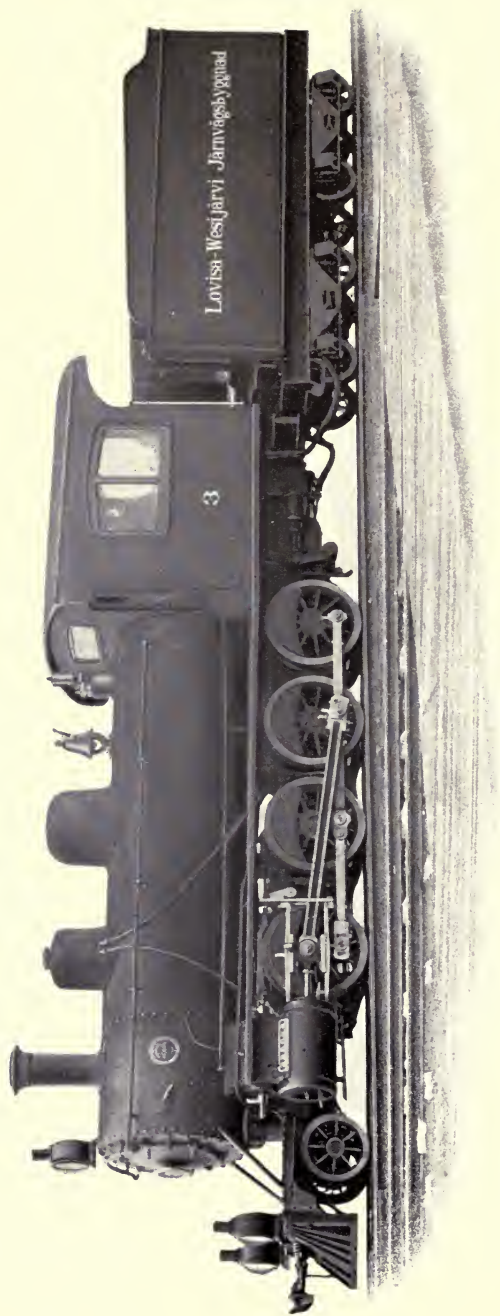
CLASS, 17 C.

WITH 8-WHEELED TENDER

TANK CAPACITY 3000 U. S. GALLONS AND $1\frac{1}{2}$ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX							
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA	TYPE	LENGTH	WIDTH			
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.									
Simple				17"	20"	8	30"	—	—	8	44"	2	28"	Improved Belpaire		60"	Long, Wide	108"	24"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS											
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE								
254	2"	10'-1 $\frac{11}{8}$ "	12'-2"	12'-2"	20'-0"	44'-11"	69000	—	93700	10500	104200								
BOILER PRESSURE				FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK							
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES						
190				Wood		1331	127	—	1458	17.4	.915	3'-0"							

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1899

FOR THE LOVISA-WESIJARVI RAILWAY
OF FINLAND.

CODE WORD, YAPON.

TYPE, CONSOLIDATION FREIGHT.

WITH 8-WHEELED TENDER

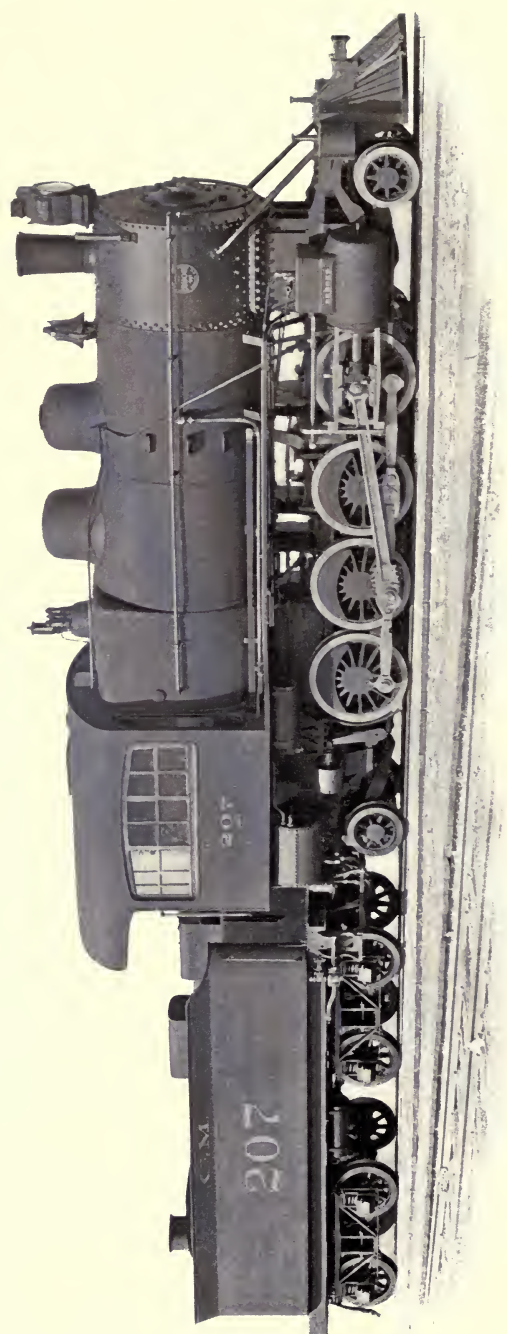
TANK CAPACITY 2500 U. S. GALLONS AND 6 TONS FUEL.

SERIES, 690.

CLASS, 14 C.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH WIDTH
Simple Piston Valve	14"	18"	8	24 $\frac{1}{2}$ "	—	8	37"	2	24 $\frac{1}{2}$ "	Rad. Stay, Straight Top	Long, Wide 110" 20"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
147	2"	8'-2 $\frac{1}{16}$ "	11'-0"	11'-0"	17'-0"	39'-1 $\frac{5}{8}$ "	46297	—	52919	7716	60635
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES
150				Wood or Coal	621	100	—	721	14.5	0.75	2'-5 $\frac{1}{2}$ "

FOR HAULING CAPACITY SEE PAGE 290.



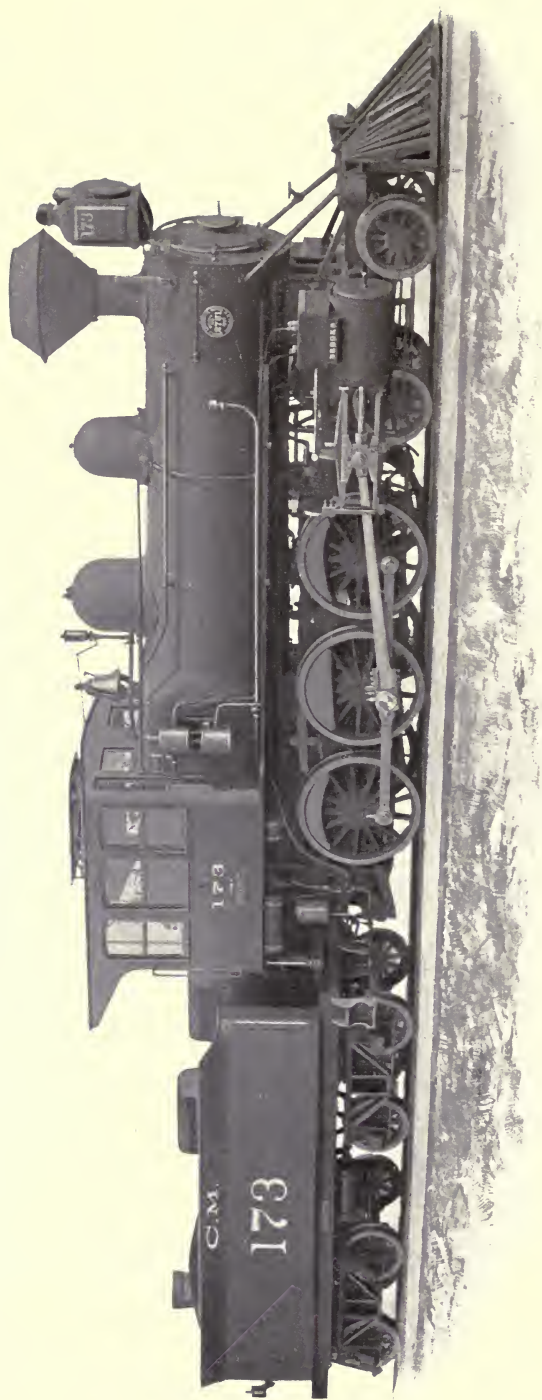
BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1897
FOR THE MEXICAN CENTRAL RAILWAY.

CODE WORD, YAPWAH. SERIES, 605.
TYPE, CONSOLIDATION FREIGHT, DOUBLE ENDER. CLASS, 21 C. P.
WITH 8-WHEELED TENDER TANK CAPACITY 4500 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX						
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE		LENGTH	WIDTH			
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.							
Simple			21"	26"	8	35½"	2	28½"	8	49"	2	28½"	Improved Belpaire		78"	Long, Wide	120"	37¾"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS										
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE							
412	2"	12'-1 ⁵ / ₁₆ "	13'-0"	13'-0"	28'-2"	52'-2"	90000	24800	145200	23450	193450							
BOILER PRESSURE				FUEL				HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
180				Bituminous Coal			2585	218	—	2803	31.45	1.435	4'-8½"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY

BROOKS LOCOMOTIVE WORKS

DUNKIRK, N. Y., U.S.A.

1897

FOR THE MEXICAN CENTRAL RAILWAY.

CODE WORD, YARRAN.

TYPE, 10-WHEELED PASSENGER.

SERIES, 602.

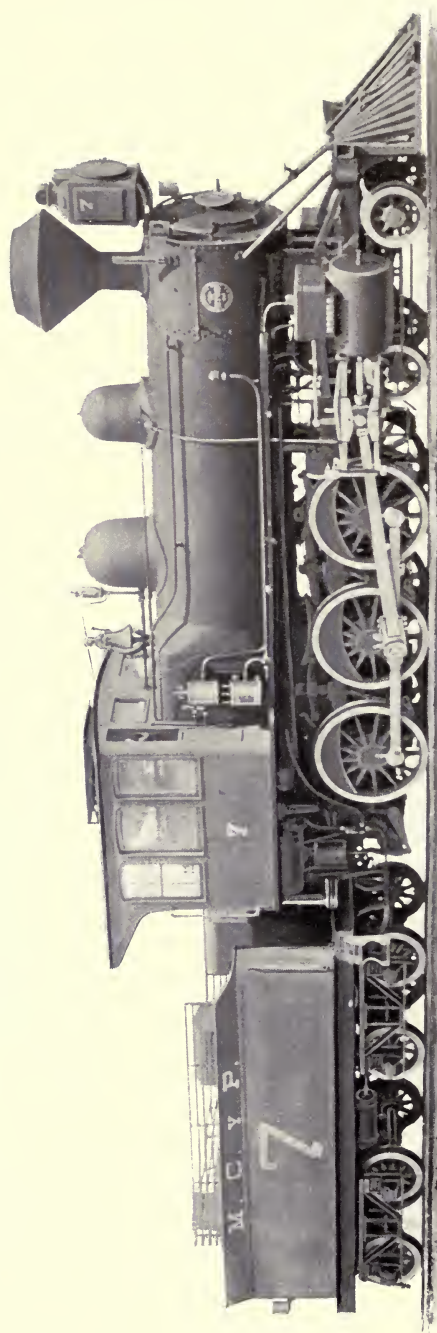
CLASS, 20 D.

WITH 8-WHEELED TENDER

TANK CAPACITY 4500 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS						BOILER			FIRE BOX			
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA	TYPE	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple		20"	24"	8	34 $\frac{1}{2}$ "	—	—	6	60"	4	34 $\frac{1}{2}$ "	Improved Belpaire	62 $\frac{1}{2}$ "	Long	120 1 $\frac{3}{16}$ "	32"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
268	2"	13'-2 $\frac{9}{16}$ "	11'-0"	11'-0"	23'-4"	51'-4"	85000	—	111000	36500	147500					
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
180				Bituminous Coal		1843.8	187.7	—	2031.5	26.1	1.435	4'-8 $\frac{1}{2}$ "				

FOR HAULING CAPACITY SEE PAGE 290.

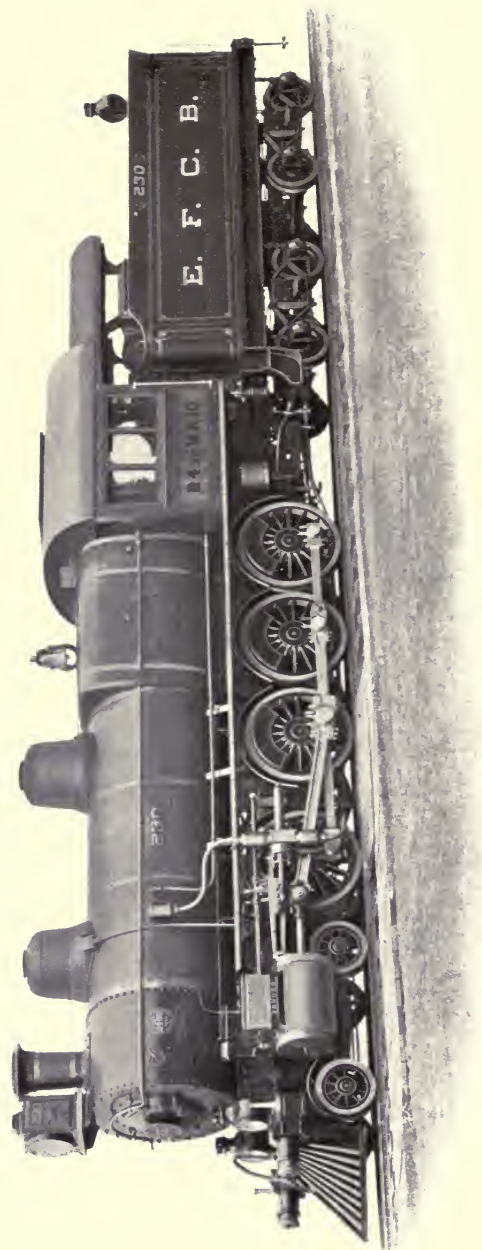


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE MEXICO CUERNAVACA & PACIFIC RAILWAY.

CODE WORD, YARROW.
 TYPE, 10-WHEELED FREIGHT.
 SERIES, 643.
 CLASS, 20 D.
 TANK CAPACITY 4500 U. S. GALLONS AND 8½ TON FUEL.
 WITH 8-WHEELED TENDER

CYLINDERS			WHEELS						BOILER		FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple		20"	24"	8	34½"	—	—	6	56"	4	28½"	Belpaire	62½"	Long	120 13⁄16"	32"
FLUES			WHEEL BASE					AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE					
268	2"	13'-2 9⁄16"	11'-0"	11'-0"	23'-4"	51'-4"	85000	—	108850	34850	143700					
BOILER PRESSURE			FUEL			HEATING SURFACE, Sq. Ft.			GRATE AREA		GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES					
180			Wood or Coal	1843.8	187.7	—	2031.5	26.1	1.435	4'-8 1⁄2"						

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1894
 FOR THE CENTRAL RAILWAY
 OF BRAZIL.

CODE WORD, YELDREN. SERIES, 530.
 TYPE, 12-WHEELED FREIGHT. CLASS, 21 F.
 WITH 8-WHEELED TENDER TANK CAPACITY 4000 U. S. GALLONS AND 8½ TONS FUEL.

CYLINDERS				WHEELS				BOILER				FIRE BOX			
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	21"	26"	8	30"	—	—	8	54"	4	28"	Improved Belpaire	68"	Long	114"	38½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
248	21½"	13'-10½"	15'-6"	15'-6"	25'-3"	52'-6¾"	82000	—	142000	28000	170000				
BOILER PRESSURE			FUEL			HEATING SURFACE, Sq. Ft.			GRATE AREA			GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
180	Bituminous Coal			1991	209	—	2200	29.3	1.60	5'-3"					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1895
FOR THE CANADIAN COPPER COMPANY.

CODE WORD, YEOMAN. SERIES, 566.
TYPE, 6-WHEELED SWITCHER. CLASS, 17 H.
WITH 8-WHEELED TENDER, SLOPING BACK TANK, CAPACITY 2500 U. S. GALLONS AND 4 TONS FUEL.

CYLINDERS				WHEELS						BOILER		FIRE BOX		
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple		17"	24"	8	30"	—	—	6	50"	—	—	Crown Bar, Wagon Top	84"	34"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
156	2"	9'-7"	10'-0"	10'-0"	10'-0"	36'-0"	62000	—	80000	—	80000			
BOILER PRESSURE			FUEL		HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
150			Bituminous Coal	770	94	—	864	18.6	1.435	4'-8½"				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.

1896
FOR THE TRANSVAAL & DELAGOA BAY COLLIERIES
OF SOUTH AFRICA.

CODE WORD, YESTEL.

SERIES, 593.

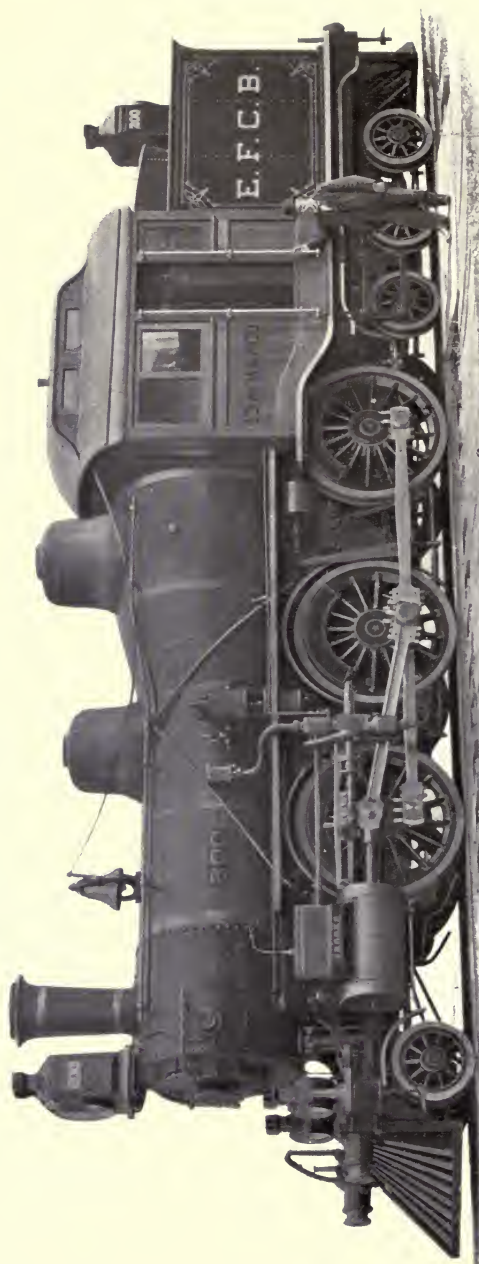
TYPE, 4-WHEELED SADDLE TANK ENGINE.

CLASS, 13 E. T.

TANK CAPACITY 600 U. S. GALLONS AND 1 TON FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING DIA.	COUPLED DRIVERS NO.	DIA.	LEADING DIA.	TYPE	DIA.	TYPE	LENGTH WIDTH
Simple	13"	18"	—	—	4	42"	—	Rad. Stay, Straight Top	40"	Deep	42" 28"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
96	2"	9'-0"	5'-8"	5'-8"	5'-8"	—	—	—	42000	—	42000
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.		GRATE AREA	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES
150	Bituminous Coal				448	49"	—	497	7.8	1.067	3'-6"

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1894
 FOR THE CENTRAL RAILWAY
 OF BRAZIL.

CODE WORD, YOCKEL.

SERIES, 533.

TYPE, 6-COUPLED DOUBLE ENDER TANK ENGINE.

CLASS, 18 B. R. X.

REAR TANK, CAPACITY 2400 U. S. GALLONS AND 3½ TONS FUEL.

CYLINDERS

WHEELS

BOILER

FIRE BOX

TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	18"	24"	—	—	6	29½"	6	62"	2	29½	Crown Bar, Wagon Top	58"	Sloping	96"	38½"

FLUES

WHEEL BASE

AVERAGE WEIGHT IN WORKING ORDER, POUNDS

NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
252	2"	11'-1⅜"	14'-0"	14'-0"	34'-0"	—	—	50000	110000	16000	176000

BOILER PRESSURE

FUEL

HEATING SURFACE, SQ. FT.

GRATE AREA

GAUGE OF TRACK

POUNDS PER SQ. INCH
 ABOVE ATMOSPHERE

KIND

FLUES

FIRE BOX

ARCH PIPES

TOTAL

SQUARE FEET

METRES

FEET INCHES

180

Bituminous Coal

1456

156

—

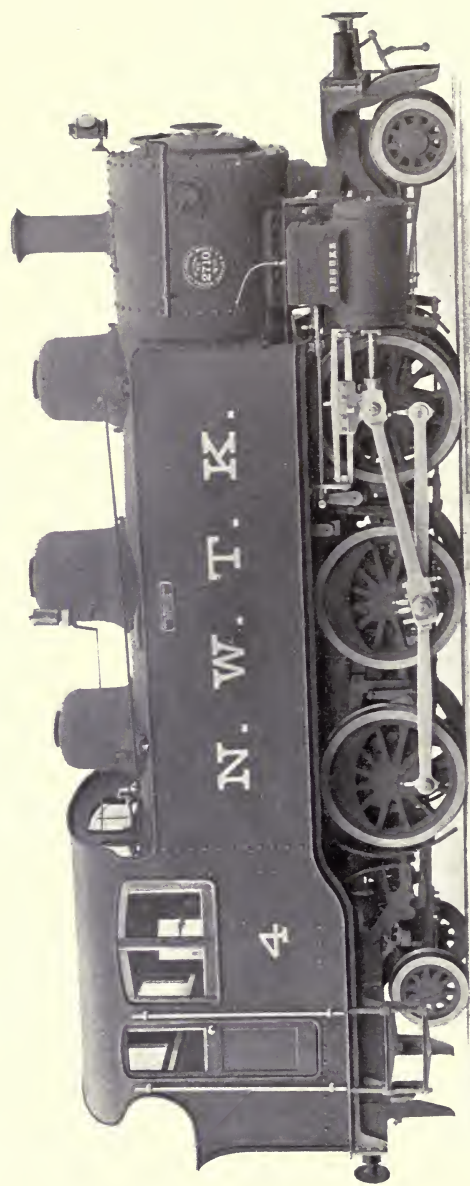
1612

24.6

1.60

5'-3"

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
DUNKIRK, N. Y., U.S.A.
1896
FOR THE NANWA RAILWAY
OF JAPAN.

CODE WORD, YODLER.
TYPE, 6-COUPLED DOUBLE ENDER TANK ENGINE.
SERIES, 588.
CLASS, 15 B. P. Y.
SIDE TANKS, CAPACITY 1200 U. S. GALLONS AND 1½ TONS FUEL.

CYLINDERS			WHEELS						BOILER		FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	15"	22"	—	—	2	26"	6	48"	2	26"	Rad. Stay, Straight Top	54"	Long, Wide, Sloping	78"	29"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
210	13 ³ / ₄ "	9'-4"	10'-4"	10'-4"	23'-8"	—	—	9000	74000	11000	94000				
BOILER PRESSURE			FUEL				HEATING SURFACE, SQ. FT.				GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
150	Bituminous Coal			894.6	87.2	—	981.8	15.2	1.067	3'-6"					

FOR HAULING CAPACITY SEE PAGE 290.

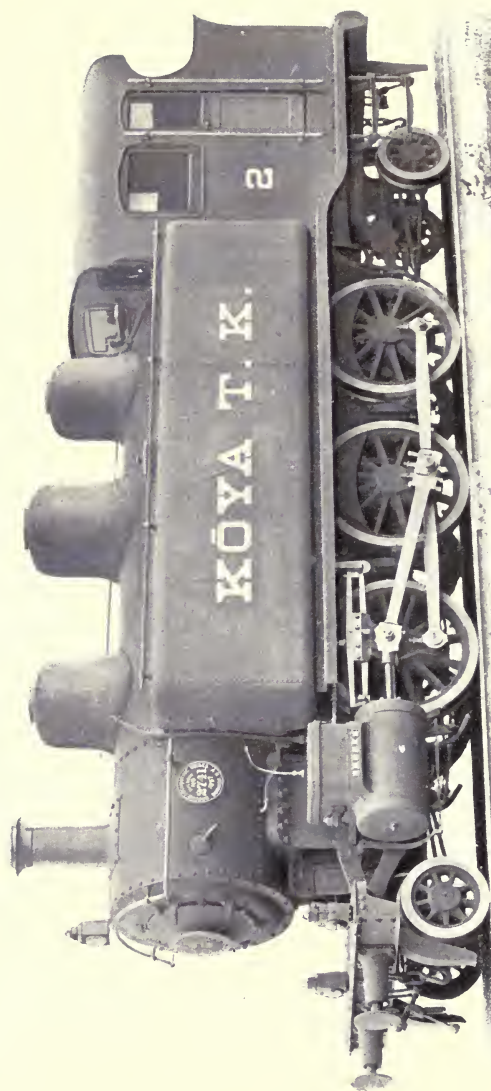


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE HANKAKU RAILWAY
 OF JAPAN.

CODE WORD, YODMAT. SERIES, 666.
 TYPE, 6-COUPLED DOUBLE ENDER TANK ENGINE. CLASS, 15 B. P. Y.
 SIDE TANKS, CAPACITY 1320 U. S. GALLONS AND 2 TONS FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX		
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.			
Simple	15"	22"	—	—	2	27 $\frac{1}{2}$ "	6	52"	2	27 $\frac{1}{2}$ "	Rad. Stay, Straight Top	54"	78" 29 $\frac{1}{2}$ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS					
NO.	DIA.	LENGTH	DRIVING		RIGID	ENGINE	ENGINE AND TENDER		TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
			NO.	DIA.			NO.	DIA.					
210	1 $\frac{3}{4}$ "	9'-4 $\frac{1}{16}$ "	10'-4"	10'-4"	10'-4"	23'-8"	—	—	—	11000	74000	10000	95000
BOILER PRESSURE				FUEL		HEATING SURFACE, SQ. FT.				GRATE AREA GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES	
160				Bituminous Coal	890	84.0	—	974	15.6	1.067	3'-6"		

FOR HAULING CAPACITY SEE PAGE 290.

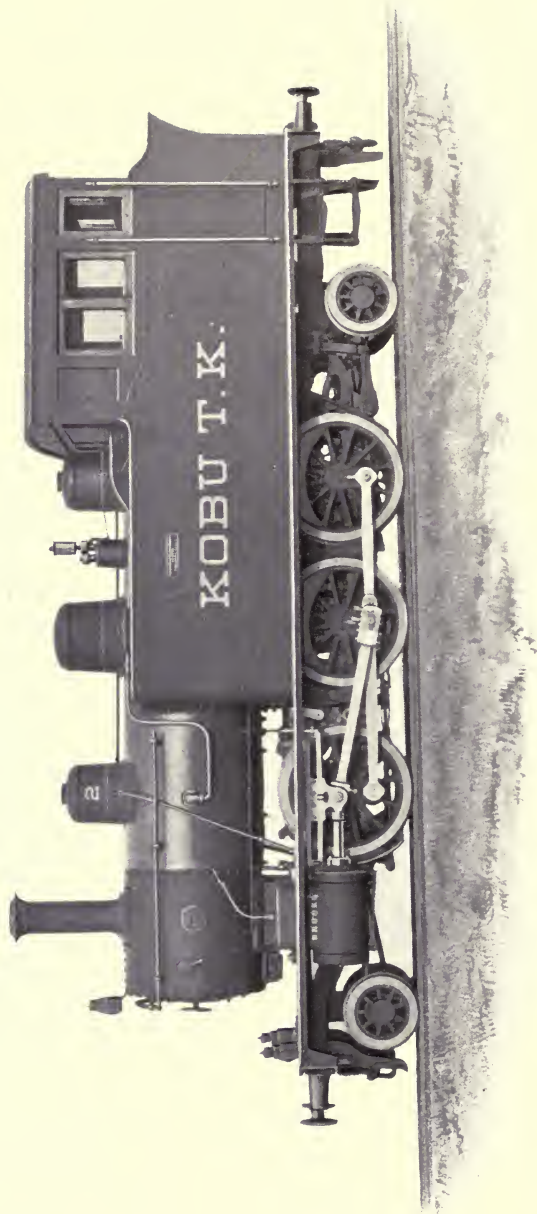


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE KŌYA RAILWAY COMPANY
 OF JAPAN.

CODE WORD, YODSTAR.
 TYPE, 6-COUPLED DOUBLE ENDER TANK ENGINE.
 SIDE TANKS, CAPACITY 1560 U. S. GALLONS AND 1½ TONS FUEL.
 SERIES, 600.
 CLASS, 15 B. P. Y.

CYLINDERS				WHEELS				BOILER				FIRE BOX					
TYPE		DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
				NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple		15"	22"	—		2 26"		6 50"		2 26"		Rad. Stay, Straight Top		Long, Wide, Sloping		75"	29½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS									
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE						
216	1½"	9'-6 1/16"	10'-4"	10'-4"	24'-4"	—	—	11000	70000	11000	92000						
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GAUGE OF TRACK					
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND		FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
150				Bituminous Coal				862	78	—	940	14.8	1.067	3'-6"			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE KOBU RAILWAY
 OF JAPAN.

CODE WORD, YOGAN.

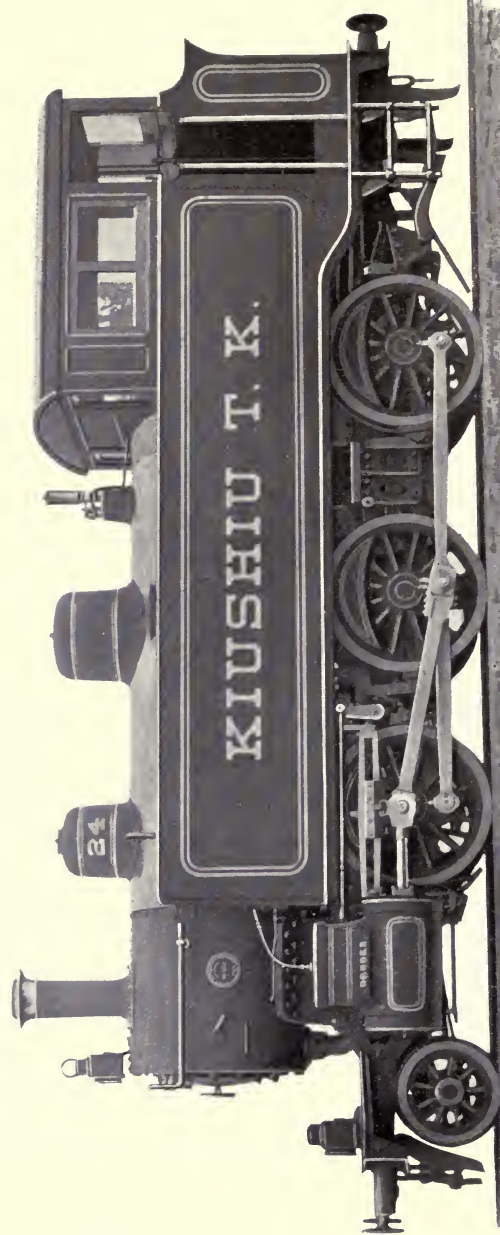
TYPE, 6-COUPLED DOUBLE ENDER TANK ENGINE.

SERIES, 622.
 CLASS, 14 B. P. Y.

SIDE TANKS, CAPACITY 1440 U. S. GALLONS AND 1½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX				
TYPE	DIA.	STROKE	TENDER		COUPLED DRIVERS		LEADING		TYPE	DIA.	TYPE	LENGTH	WIDTH	
			NO.	DIA.	NO.	DIA.	NO.	DIA.						
Simple	14"	20"	—	—	2	26"	6	48"	2	26"	Rad. Stay, Straight Top	70"	29"	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
170	13 1/4"	9'-1 1/16"	9'-8"	9'-8"	22'-0"	—	—	13000	65000	9000	87000			
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES		
165	Bituminous Coal				693	74	—	767	13.6	1.067	3'-6"			

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1898
 FOR THE KIUSHIU RAILWAY
 OF JAPAN.

CODE WORD, YONDER.
 TYPE, 6-COUPLED TANK ENGINE.

SERIES, 630.
 CLASS, 17 B. Y.

SIDE TANKS, CAPACITY 1320 U. S. GALLONS AND 1½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX		
TYPE	DIA.	STROKE	TENDER NO.	DIA.	TRAILING NO.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH WIDTH	
Simple	17"	22"	—	—	—	6	50"	2	30"	Rad. Stay, Straight Top	Long, Wide, Sloping	72" 29½"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS				
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE	
190	1¾"	9'-7"	12'-0"	12'-0"	19'-0"	—	—	—	74000	15600	89600	
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES	
160	Bituminous Coal				827	78.1	—	905.1	14.1	1.067	3'-6"	

FOR HAULING CAPACITY SEE PAGE 290.



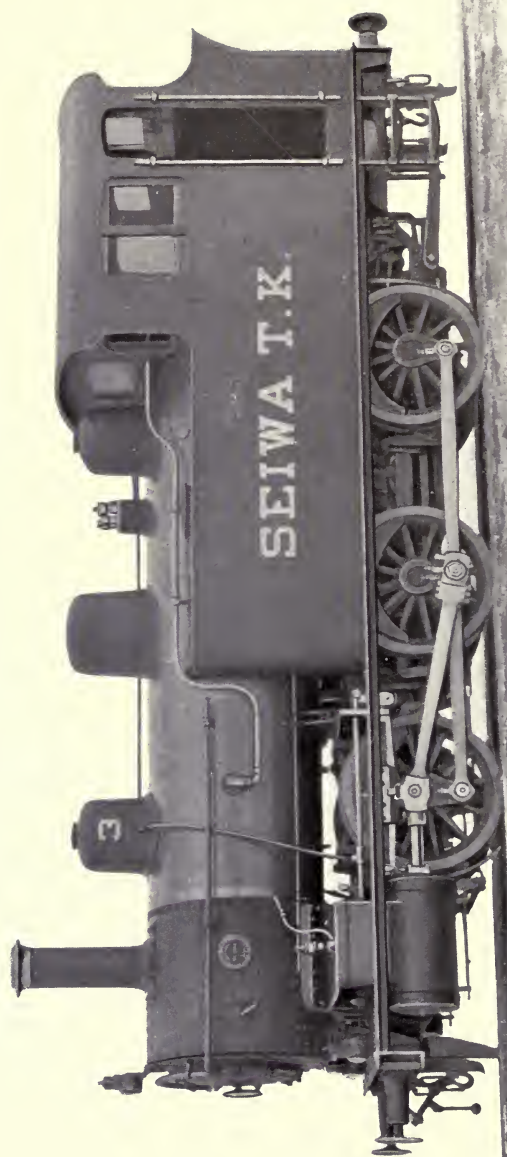
BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE SEOUL-CHEMULPO RAILWAY
 OF KOREA.

CODE WORD, YONGE. SERIES, 629.
 TYPE, 6-COUPLED TANK ENGINE. CLASS, 14 B. Y.

SIDE TANKS, CAPACITY 960 U. S. GALLONS AND 1 TON FUEL.

CYLINDERS				WHEELS				BOILER			FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	14"	22"	—	—	—	—	6	42"	2	28"	Rad. Stay, Straight Top	46"	Deep	54"	35"
FLUES			WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS								
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
122	2"	9'-1"	12'-3"	12'-3"	19'-0"	—	—	—	65000	10000	75000				
BOILER PRESSURE			FUEL			HEATING SURFACE, Sq. Ft.			GRATE AREA			GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES				
140	Bituminous Coal			575	71.2	—	646.2	12.66	1.435	4'-8 $\frac{1}{2}$ "					

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE SEIWA RAILWAY
 OF JAPAN.

CODE WORD, YONKER.

TYPE, 6-WHEELED TANK ENGINE.

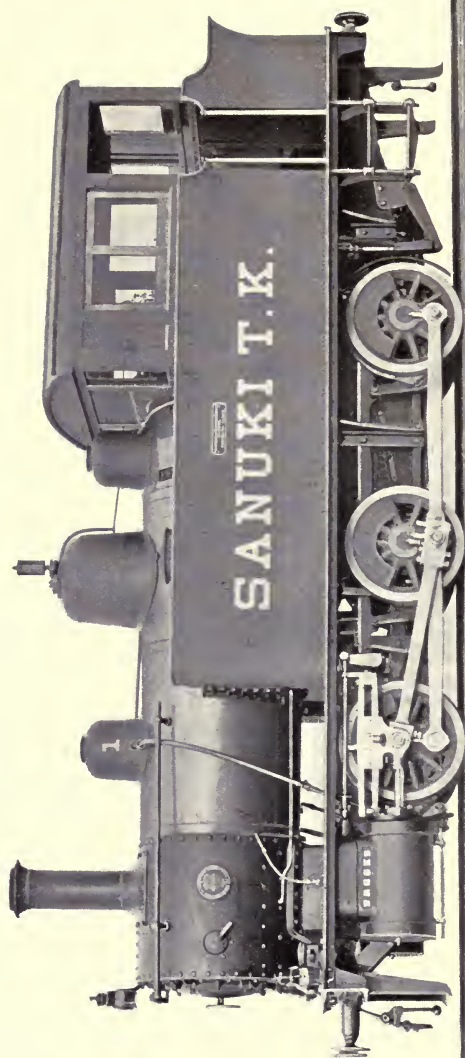
SERIES, 625.

CLASS, 15 H. Y.

SIDE TANKS, CAPACITY 1120 U. S. GALLONS AND 1½ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX					
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		DIA.	TYPE	LENGTH	WIDTH	
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple	15"	22"	—	—	—	—	6	48"	—	—	Rad. Stay, Straight Top	Long, Wide, Sloping	72"	29½"	
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS							
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE				
176	13"	9'-7"	11'-9"	11'-9"	11'-9"	—	—	—	85000	—	85000				
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.				GRATE AREA		GAUGE OF TRACK	
				KIND		FLUES	FIRE BOX	ARCH TUBES	TOTAL		SQUARE FEET		METRES	FEET	INCHES
140	Bituminous Coal				764	77	—	841	14.1		1.067		3'-6"		

FOR HAULING CAPACITY SEE PAGE 290.

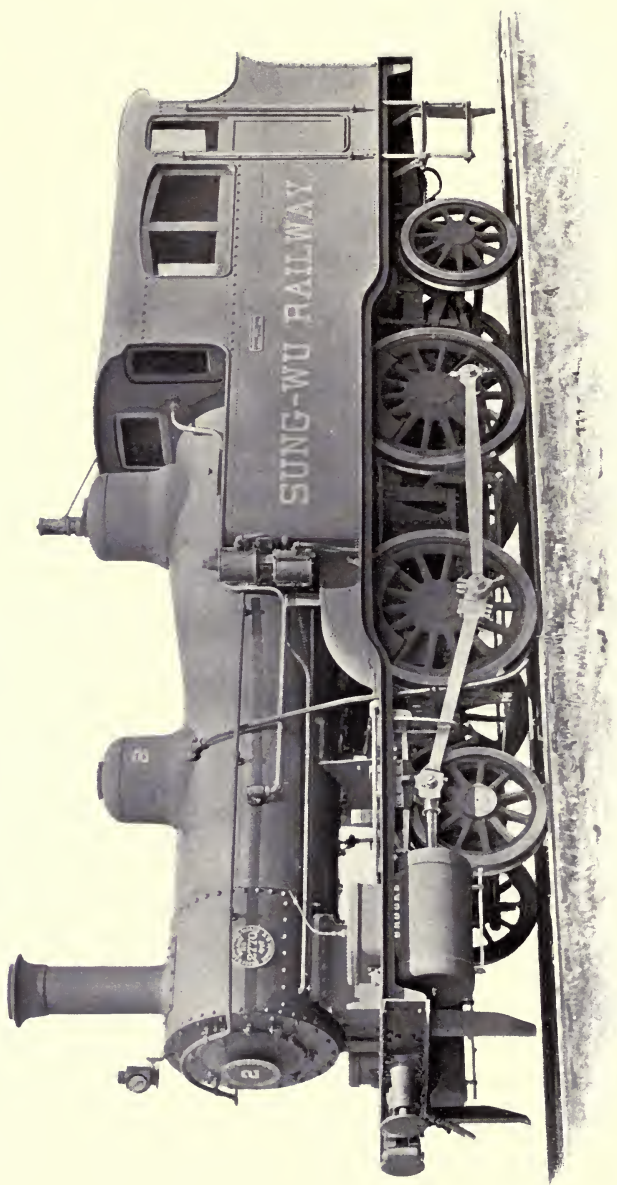


BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE SANUKI RAILWAY
 OF JAPAN.

CODE WORD, YOWL.
 TYPE, 6-WHEELED TANK ENGINE.
 SERIES, 631.
 CLASS, 14 H. Y.
 SIDE TANKS, CAPACITY 972 U. S. GALLONS AND 1 TON FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH WIDTH
Simple	14"	18"	—	—	—	6	36"	—	—	Rad. Stay, Straight Top	60 1/8" 23 1/8"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
124	1 3/4"	8'-4"	11'-0"	11'-0"	11'-0"	—	—	—	60000	—	60000
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES
150	Bituminous Coal				466	68	—	534	9.5	1.067	3'-6"

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE SUNG-WU RAILWAY
 OF CHINA.

CODE WORD, YUCCAN.

TYPE, 4-COUPLED DOUBLE ENDER TANK ENGINE.

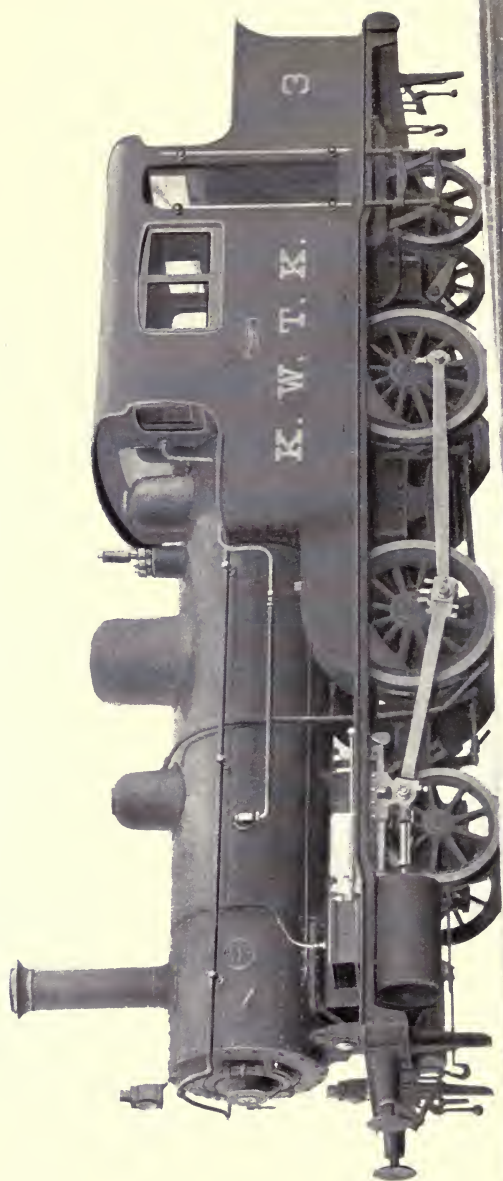
SERIES, 611.

CLASS, 17 J. P. Y.

SIDE TANKS, CAPACITY 1360 U. S. GALLONS AND 1 $\frac{1}{2}$ TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX			
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING	DIA.	TYPE	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.					
Simple 16.536" 23.62" — — 2 42" 4 62.59" 2 42" Crown Bar, 48" Long, Sloping 78" 34"													
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS					
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE		
165	2"	11'-11"	7'-6"	7'-6"	20'-0"	—	—	24800	59000	29000	112800		
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.		GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND		FLUES	FIRE BOX	ARCH TILES	TOTAL	SQ. FEET	METRES	FEET	INCHES	
162	Bituminous Coal				957	93.82	—	1050.82	17.9	1.435	4'-8½"		

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE KIWA RAILWAY
 OF JAPAN.

CODE WORD, YULAN.

TYPE, 4-COUPLED DOUBLE ENDER TANK ENGINE.

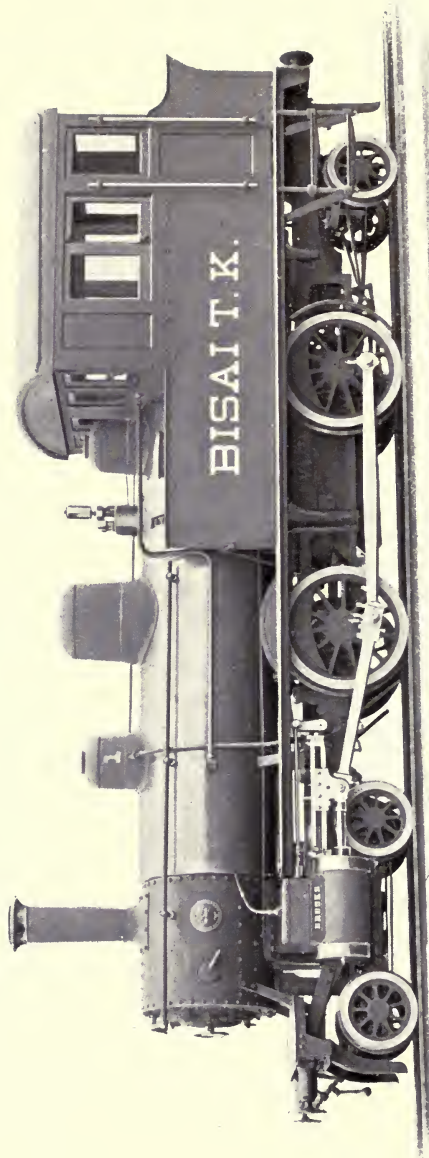
SERIES, 615.

CLASS, 14 J. P. Y.

SIDE AND REAR TANKS, CAPACITY 1200 U. S. GALLONS AND 2 TONS FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING NO.	DIA.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH WIDTH
Simple	14"	20"	—	2	37"	4	52"	2	37"	Rad. Stay, Straight top	67" 27"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
150	1 $\frac{3}{4}$ "	9'-7"	7'-6"	7'-6"	19'-6"	—	—	15350	43800	18500	77650
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES
140	Bituminous Coal			658	64	—	722	12.5	1.067	3'-6"	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE BISAI RAILWAY
 OF JAPAN.

CODE WORD, YUMAS.

SERIES, 614.

TYPE, 4-COUPLED DOUBLE ENDER TANK ENGINE.

CLASS, 12 A. P. Y.

SIDE TANKS, CAPACITY 700 U. S. GALLONS AND $\frac{3}{4}$ TON FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	TRAILING NO.	COUPLED DRIVERS NO.	LEADING DIA.	NO.	TYPE	DIA.	TYPE	LENGTH WIDTH
Simple	12"	18"	—	2	4	24"	4	42"	42"	Long, Sloping	72" 24"
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
118	1 $\frac{3}{4}$ "	9'-0"	7'-6"	7'-6"	24'-0"	—	—	8000	36000	14000	58000
BOILER PRESSURE			FUEL		HEATING SURFACE, SQ. FT.			GRATE AREA		GAUGE OF TRACK	
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES
165			Bituminous Coal	482.7	67.3	—	550	11.6	1.067	3'-6"	

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.

1891
 FOR THE SANTA MARIA MAGDALENA RAILWAY
 OF BRAZIL.

CODE WORD, YUPAS.

SERIES, 437.
 CLASS, 12 J. P. T.

TYPE, 4-COUPLED DOUBLE ENDER SADDLE TANK ENGINE.

TANK CAPACITY 700 U. S. GALLONS AND 1 TON FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX				
TYPE	DIA.	STROKE	TENDER		TRAILING		COUPLED DRIVERS		LEADING		TYPE	DIA.	LENGTH	WIDTH
			NO.	DIA.	NO.	DIA.	NO.	DIA.	NO.	DIA.				
Simple	12"	18"	—	—	2	24"	4	42"	2	24"	Straight Top	40"	60"	24"
FLUES			WHEEL BASE					AVERAGE WEIGHT IN WORKING ORDER, POUNDS						
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE			
92	2"	9'-0"	5'-8"	5'-8"	20'-0"	—	—	14000	36000	6000	56000			
BOILER PRESSURE			FUEL		HEATING SURFACE, SQ. FT.					GRATE AREA		GAUGE OF TRACK		
POUNDS PER SQ. INCH ABOVE ATMOSPHERE			KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET	INCHES			
150	Bituminous Coal		430	63	—		493	9.6	1.000	3'-3 ³ / ₈ "				

FOR HAULING CAPACITY SEE PAGE 290.



BUILT BY
BROOKS LOCOMOTIVE WORKS
 DUNKIRK, N. Y., U.S.A.
 1897
 FOR THE NANYO RAILWAY
 OF JAPAN.

CODE WORD, YUPONT.

TYPE, 4-WHEELED TANK ENGINE.

SERIES, 613.

CLASS, 8 E. Y.

SIDE TANKS, CAPACITY 360 U. S. GALLONS AND $\frac{1}{2}$ TON FUEL.

CYLINDERS				WHEELS				BOILER		FIRE BOX	
TYPE	DIA.	STROKE	TENDER NO.	DIA.	TRAILING NO.	COUPLED DRIVERS NO.	DIA.	LEADING NO.	DIA.	TYPE	LENGTH WIDTH
Simple	8"	14"	—	—	—	4	30"	—	—	Rad. Stay, Straight Top	27" 24 $\frac{5}{8}$ "
FLUES				WHEEL BASE				AVERAGE WEIGHT IN WORKING ORDER, POUNDS			
NO.	DIA.	LENGTH	DRIVING	RIGID	ENGINE	ENGINE AND TENDER	TENDER	TRAILING WHEELS	DRIVERS	LEADING WHEELS	TOTAL ENGINE
56	1 $\frac{5}{8}$ "	8'-0"	4'-6"	4'-6"	4'-6"	—	—	—	23000	—	23000
BOILER PRESSURE				FUEL				HEATING SURFACE, Sq. Ft.			
								GRATE AREA			
								GAUGE OF TRACK			
POUNDS PER SQ. INCH ABOVE ATMOSPHERE				KIND	FLUES	FIRE BOX	ARCH PIPES	TOTAL	SQUARE FEET	METRES	FEET INCHES

150

Bituminous Coal

212

22.4

—

234.4

4.3

.7628

2'-6"

FOR HAULING CAPACITY SEE PAGE 290.

TABLES OF INFORMATION.

EXPLANATION OF TABLES.

In the formulæ used to calculate the tables found on the succeeding pages, the following symbols are used :

- D = Diameter of cylinders in inches.
 L = Length of stroke in inches.
 w = Diameter of drivers in inches.
 P = Boiler pressure.
 p = Mean available pressure in cylinders = mean effective pressure less an amount equivalent to the internal friction of the engine.
 W = Weight of engine and tender in tons of 2000 pounds.
 T = Tractive power in pounds.
 H = Hauling capacity = weight of train behind the draw bar in tons of 2000 pounds.
 S = Speed in miles per hour.
 M = Grade in feet per mile.
 C = Curvature of track in degrees.
 R_s = Resistance of train in pounds per ton of 2000 pounds, due to speed.
 R_m = Resistance of train in pounds per ton of 2000 pounds, due to grade.
 R_c = Resistance of train in pounds per ton of 2000 pounds, due to curves.
 R = $R_s + R_m + R_c$ = Resistance of train in pounds per ton of 2000 pounds.

TABLE I.
TRACTIVE POWER OF LOCOMOTIVES.

This table gives the value of 'T' for different values of 'p'; it is calculated from the formula,

$$T = \frac{D^2 \times L}{W} \times p$$

TABLE II.
NUMBER OF FEET THE PISTON TRAVELS PER ENGINE MILE.

This table is to enable one to find the speed of the piston in feet per minute when the stroke, driving wheel diameter and speed of engine in miles per hour are known. The table is in two parts, being divided by a diagonal line; the upper part gives the piston travel per engine mile as calculated from the stroke and driving wheel diameter, while the lower part gives the piston travel per engine mile as calculated from the piston speed in feet per minute and the speed in miles per hour at which the engine is running.

The use of the table is best explained by means of an example. Let us take a locomotive with 24" stroke and 62" drivers, running at a speed of thirty miles per hour. In the upper part of the table on the same line as 24" in the stroke column, and under 62" diameter of drivers, is found 1301; now in the lower part of the table on the same line with thirty miles per hour look for the number nearest to 1301, which number, 1300, is to be found over a piston speed of 650 feet per minute. The piston speed of the engine in this example is therefore very close to 650 feet per minute.

TABLE III.
MEAN AVAILABLE PRESSURES AT DIFFERENT PISTON SPEEDS AND BOILER PRESSURES.

In order to avoid an extra calculation for the internal friction of the engine, the mean available instead of the mean effective pressures at the different piston speeds are given. The mean available pressure is the mean effective pressure, reduced by the amount that would be required to overcome the internal friction of the engine.

TABLE IV.
NUMBER OF REVOLUTIONS OF DRIVING WHEELS PER MILE.

This table gives the number of revolutions made by driving wheels of different diameters in running a mile.

TABLE V.
TRAIN RESISTANCE IN POUNDS PER TON.

In this table are given the values of train resistance for different grades and speeds. The resistances due to speed have been calculated from the formula :

$$R_s = \frac{S}{4} + 2$$

while for the grade resistances the formula

$$R_m = 0.3788 M$$

has been used.

The values in the table are equal to $R_s + R_m$. On the line with a speed of 0 miles per hour are to be found the resistances due to grade alone, while in the column under 0 grade, the resistances due to speed on a level track are given.

TABLE VI.
RESISTANCE OF CURVES.

The easiest way to account for the resistance due to curvature of the track is to find the grade that offers the same resistance as the curve in question. The resistance due to curvature is taken at $\frac{1}{2}$ pound per degree of curvature. Then,

$$R_c = 0.5 C$$

but,

$$R_m = 0.3788 M$$

To find the equivalent grade put $R_c = R_m$

$$\text{or} \quad 0.3788 M = 0.5 C$$

then

$$M = \frac{0.5}{0.3788} C = 1.32 C$$

Therefore, to find the grade equivalent of a curve multiply the curve in degrees by 1.32 and the result will be the equivalent grade in feet per mile. The grade equivalents are given in this table.

TABLE VII. SPEED IN MILES PER HOUR.

This table gives the speed in miles per hour for various diameters of drivers and different revolutions of same per minute.

HAULING CAPACITY OF LOCOMOTIVES.

To find the hauling capacity of a locomotive, first find the piston speed by means of Table II., then look in Table III. for the mean available pressure corresponding to that piston speed and to the boiler pressure of the engine in question. Then in Table I. find the tractive power corresponding to the diameter of cylinder, stroke, driving wheel diameter and the mean available pressure nearest to the one just found in Table III. After finding the grade equivalent of the curvature in Table VI., add it to the actual grade; then under this sum, and on a line with the speed in miles per hour in Table V., ascertain the total resistance, R. The hauling capacity in tons is then represented by the formula :

$$H = \frac{T}{R} - W$$

that is, the hauling capacity equals the tractive power divided by the resistance per ton, less the weight of engine and tender.

TABLE VIII. MEAN EFFECTIVE PRESSURE.

This diagram gives the ratio between the mean effective pressure on the piston and the boiler pressure at different piston speeds.

TABLE IX. MEAN AVAILABLE PRESSURE.

This diagram gives the ratio between the mean available pressure acting on the piston, and the boiler pressure at different piston speeds.

COMPOUND LOCOMOTIVES.—For tables of relative dimensions see pages 22-24.

TABLE I.

TRACTIVE POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS DIA. STROKE		MEAN EFF. PRES.	DIAMETER OF DRIVERS												
			28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"	50"	
8" x 10"			1	22.85	21.33	20.00	18.82	17.78	16.84	16.00	15.24	14.54	13.91	13.33	12.80
		35	800	746	700	659	622	589	560	533	509	487	466	448	
		50	1142	1066	1000	941	889	842	800	762	727	695	666	640	
		65	1485	1386	1300	1223	1156	1094	1040	990	945	904	866	832	
		80	1828	1706	1600	1505	1422	1347	1280	1219	1163	1113	1066	1024	
		95	2170	2026	1900	1788	1689	1600	1520	1448	1381	1321	1266	1216	
		110	2514	2346	2200	2070	1956	1852	1760	1676	1599	1530	1466	1408	
		125	2836	2666	2500	2352	2222	2105	2000	1905	1817	1739	1666	1600	
8" x 12"			1	27.12	25.39	24.00	22.38	21.33	20.21	19.20	18.28	17.45	16.69	16.00	15.36
		35	960	896	840	790	746	707	672	640	611	584	560	537	
		50	1371	1270	1200	1129	1068	1010	960	914	872	834	800	768	
		65	1782	1663	1560	1467	1386	1315	1248	1188	1134	1085	1040	998	
		80	2193	2047	1920	1806	1706	1617	1536	1462	1396	1335	1280	1228	
		95	2605	2431	2280	2145	2026	1920	1824	1736	1657	1585	1520	1459	
		110	3016	2815	2640	2484	2346	2223	2112	2011	1920	1836	1760	1690	
		125	3427	3199	3000	2822	2666	2526	2400	2285	2181	2086	2000	1920	
8" x 14"			1	32.00	29.56	28.00	26.35	24.89	23.58	22.40	21.33	20.36	19.48	18.66	17.92
		35	1120	1045	980	922	871	825	784	746	712	682	653	627	
		50	1600	1493	1400	1317	1241	1179	1120	1066	1016	974	933	896	
		65	2080	1941	1820	1712	1618	1533	1456	1386	1323	1266	1213	1163	
		80	2560	2385	2240	2108	1991	1886	1792	1706	1628	1568	1495	1433	
		95	3040	2826	2660	2503	2364	2240	2128	2026	1934	1830	1752	1702	
		110	3520	3265	3080	2898	2738	2594	2464	2346	2240	2143	2052	1971	
		125	4000	3792	3590	3394	3294	3111	2947	2800	2666	2545	2445	2352	2240
8" x 16"			1	36.57	34.12	32.00	30.11	28.44	26.94	25.60	24.38	23.27	22.26	21.33	20.48
		35	1280	1194	1120	1054	995	943	896	853	815	779	747	717	
		50	1828	1706	1600	1505	1422	1347	1280	1219	1163	1113	1066	1024	
		65	2377	2218	2080	1957	1848	1751	1664	1581	1512	1447	1386	1331	
		80	2925	2730	2560	2408	2275	2155	2048	1950	1861	1781	1708	1638	
		95	3474	3242	3040	2860	2702	2559	2432	2316	2210	2114	2028	1945	
		110	4023	3754	3520	3312	3128	2963	2816	2682	2560	2449	2346	2253	
		125	4571	4266	4000	3764	3555	3367	3200	3047	2900	2752	2666	2560	

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS DIA. STROKE		MEAN EFF. PRES.	DIAMETER OF DRIVERS														
			28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"	50"			
9" x 12"			1	34.71	32.40	30.37	28.58	27.00	25.58	24.30	23.14	22.09	21.13	20.25	19.44		
		35	1214	1134	1063	1000	945	895	850	810	773	740	709	680			
		50	1755	1640	1518	1429	1350	1279	1215	1157	1104	1056	1012	972			
		65	2256	2106	1974	1857	1755	1662	1579	1504	1435	1373	1316	1263			
		80	2776	2592	2429	2286	2160	2046	1944	1851	1767	1690	1620	1555			
		95	3297	3078	2885	2715	2565	2430	2308	2198	2098	2007	1923	1846			
		110	3818	3564	3341	3144	2970	2814	2673	2545	2430	2324	2227	2138			
		125	4339	4050	3796	3572	3375	3197	3037	2892	2761	2641	2531	2430			
9" x 14"			1	40.50	37.80	35.44	33.35	31.50	29.81	28.35	27.00	25.77	24.65	23.62	22.68		
		35	1417	1323	1240	1167	1102	1044	992	945	902	863	827	794			
		50	2025	1890	1772	1667	1575	1492	1417	1350	1288	1232	1181	1134			
		65	2632	2457	2303	2168	2047	1939	1842	1755	1675	1602	1535	1474			
		80	3240	3024	2835	2668	2520	2387	2268	2160	2061	1972	1889	1814			
		95	3847	3591	3366	3168	2992	2835	2693	2565	2448	2344	2244	2154			
		110	4453	4158	3898	3669	3465	3282	3118	2970	2835	2711	2598	2495			
		125	5061	4725	4430	4169	3937	3730	3544	3375	3221	3081	2952	2835			
9" x 16"			1	46.28	43.20	40.50	38.12	36.00	34.10	32.40	30.86	29.45	28.17	27.00	25.92		
		35	1620	1512	1417	1334	1260	1193	1134	1080	1031	986	945	907			
		50	2314	2160	2025	1906	1800	1705	1620	1543	1472	1408	1350	1296			
		65	3008	2808	2632	2478	2340	2216	2106	2006	1914	1831	1755	1685			
		80	3702	3456	3240	3049	2880	2728	2592	2469	2356	2254	2160	2074			
		95	4396	4141	3847	3621	3420	3239	3078	2932	2798	2675	2565	2462			
		110	5091	4752	4455	4193	3960	3751	3564	3395	3240	3099	2970	2851			
		125	5786	5400	5063	4765	4500	4263	4050	3858	3681	3521	3375	3240			
9" x 18"			1	52.07	48.60	45.56	42.88	40.50	38.37	36.45	34.71	33.14	31.70	30.38	29.16		
		35	1822	1701	1594	1501	1425	1343	1276	1215	1160	1109	1063	1021			
		50	2603	2430	2278	2144	2025	1918	1822	1735	1657	1585	1519	1458			
		65	3385	3150	2961	2787	2632	2494	2369	2256	2154	2060	1975	1895			
		80	4165	3888	3645	3430	3240	3069	2916	2777	2651	2536	2430	2333			
		95	4946	4617	4328	4073	3847	3645	3463	3297	3148	3011	2886	2770			
		110	5728	5346	5011	4717	4455	4221	4010	3818	3646	3487	3342	3208			
		125	6510	6075	5696	5360	5063	4797	4557	4339	4143	3963	3798	3645			

TABLE I.—(Continued).

TRACTIVE POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS DIA. STROKE	MEAN EFF. PRES.	DIAMETER OF DRIVERS											
		28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"	50"
10" x 12"													
1	42.86	40.00	37.50	35.30	33.33	31.58	30.00	28.57	27.27	26.09	25.00	24.00	
35	1500	1400	1313	1235	1166	1105	1050	1000	954	913	875	840	
50	2163	2000	1875	1765	1667	1579	1500	1428	1363	1305	1250	1200	
65	2786	2600	2438	2294	2167	2053	1950	1857	1772	1696	1625	1560	
80	3429	3200	3000	2824	2667	2526	2400	2286	2181	2087	2000	1920	
95	4071	3800	3562	3353	3167	3000	2850	2714	2590	2478	2375	2280	
110	4715	4400	4125	3883	3667	3474	3300	3143	3000	2870	2750	2640	
125	5358	5000	4688	4413	4167	3948	3750	3571	3409	3261	3125	3000	
10" x 14"													
1	50.00	46.67	43.75	41.18	38.89	36.84	35.00	33.33	31.82	30.44	29.17	28.00	
35	1750	1633	1531	1441	1361	1289	1225	1167	1114	1065	1021	980	
50	2500	2333	2187	2059	1944	1842	1750	1667	1591	1522	1459	1400	
65	3250	3033	2844	2677	2528	2395	2275	2167	2068	1978	1896	1820	
80	4000	3733	3500	3294	3111	2947	2800	2666	2546	2435	2334	2240	
95	4750	4434	4156	3912	3694	3500	3325	3166	3023	2892	2771	2660	
110	5500	5131	4813	4530	4278	4053	3850	3667	3500	3349	3200	3080	
125	6250	5831	5469	5148	4861	4605	4375	4167	3978	3805	3647	3500	
10" x 16"													
1	57.15	53.33	50.00	47.06	44.45	42.11	40.00	38.10	36.37	34.78	33.33	32.00	
35	2000	1866	1750	1647	1556	1474	1400	1333	1273	1217	1167	1120	
50	2837	2666	2500	2353	2222	2105	2000	1905	1818	1739	1667	1600	
65	3714	3466	3250	3059	2889	2737	2600	2476	2364	2261	2167	2080	
80	4572	4266	4000	3765	3555	3369	3200	3048	2909	2782	2666	2560	
95	5430	5066	4750	4471	4223	4000	3800	3619	3455	3304	3167	3040	
110	6287	5867	5500	5177	4890	4633	4400	4191	4001	3826	3667	3520	
125	7144	6667	6250	5883	5557	5264	5000	4763	4547	4348	4167	4000	
10" x 18"													
1	64.29	60.00	56.25	52.94	50.00	47.37	45.00	42.86	40.91	39.13	37.50	36.00	
35	2250	2100	1969	1853	1750	1658	1575	1500	1432	1370	1313	1260	
50	3214	3000	2812	2647	2500	2368	2250	2143	2045	1956	1875	1800	
65	4178	3900	3656	3441	3250	3079	2925	2786	2659	2543	2438	2340	
80	5143	4800	4500	4255	4000	3790	3600	3429	3273	3130	3000	2880	
95	6107	5700	5344	5029	4750	4500	4275	4072	3886	3717	3562	3420	
110	7072	6600	6188	5824	5500	5211	4950	4715	4501	4305	4126	3960	
125	8037	7500	7032	6618	6250	5922	5625	5358	5114	4892	4688	4500	

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS DIA. STROKE	MEAN EFF. PRES.	DIAMETER OF DRIVERS											
		28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"	50"
11" x 14"	1	69.50	56.46	52.94	49.82	47.05	44.58	42.35	40.33	38.50	36.83	35.29	33.88
	35	2117	1976	1853	1743	1646	1560	1482	1411	1347	1289	1235	1186
	50	3025	2823	2641	2481	2352	2229	2117	2016	1925	1841	1764	1694
	65	3362	3069	2841	2628	2458	2307	2172	2052	1946	1854	1774	1702
	80	4840	4516	4235	3985	3764	3566	3387	3226	3080	2946	2823	2710
	95	5747	5363	5029	4732	4469	4235	4023	3831	3657	3498	3352	3218
11" x 16"	110	6555	6210	5824	5480	5176	4904	4658	4436	4235	4051	3882	3727
	125	7563	7057	6618	6228	5882	5572	5294	5041	4813	4604	4411	4235
11" x 18"	1	69.14	64.53	60.50	56.94	53.78	50.94	48.40	46.09	44.00	42.09	40.33	38.72
	35	2420	2258	2117	1993	1882	1783	1694	1613	1540	1473	1411	1355
	50	3457	3226	3025	2847	2689	2547	2420	2304	2200	2104	2016	1936
	65	4494	4194	3932	3701	3495	3311	3145	2995	2860	2736	2621	2516
	80	5531	5162	4840	4555	4302	4075	3871	3687	3520	3367	3226	3097
	95	6568	6130	5747	5409	5108	4839	4597	4378	4180	3998	3831	3678
11" x 18"	110	7606	7098	6655	6264	5916	5603	5324	5070	4840	4630	4436	4259
	125	8643	8066	7563	7118	6721	6367	6050	5761	5500	5261	5041	4840
11" x 20"	1	77.78	72.60	68.06	64.06	60.50	57.31	54.45	51.86	49.50	47.35	45.37	43.56
	35	2722	2541	2382	2242	2117	2006	1906	1815	1732	1657	1588	1524
	50	3889	3630	3403	3203	3025	2865	2722	2593	2475	2367	2268	2178
	65	5053	4718	4423	4163	3932	3724	3530	3350	3177	3020	2881	2758
	80	6222	5808	5441	5124	4840	4584	4355	4138	3930	3737	3559	3391
	95	7389	6896	6465	6085	5747	5441	5172	4926	4698	4480	4281	4098
11" x 20"	110	8556	7986	7487	7046	6655	6304	5994	5705	5445	5208	4991	4792
	125	9723	9075	8508	8008	7563	7164	6806	6483	6188	5918	5671	5445
11" x 20"	1	80.66	75.62	71.17	67.22	63.68	60.50	57.62	55.00	52.61	50.42	48.40	46.50
	35	2823	2646	2491	2352	2228	2117	2016	1925	1841	1764	1694	1630
	50	4033	3780	3558	3361	3184	3025	2881	2750	2630	2521	2420	2326
	65	5242	4915	4623	4369	4139	3932	3745	3575	3419	3277	3146	3021
	80	6452	6049	5693	5377	5094	4840	4600	4381	4180	3998	3831	3678
	95	7662	7183	6760	6385	6049	5747	5473	5225	4997	4790	4597	4414
11" x 20"	110	8873	8318	7820	7394	7005	6655	6338	6050	5788	5546	5321	5114
	125	10080	9452	8896	8402	7960	7563	7263	6975	6707	6457	6221	6000

TABLE I.—(Continued).

TRACTIVE POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS		MEAN EFF. PRES.	DIAMETER OF DRIVERS															
DIA.	STROKE		30"	32"	34"	36"	38"	40"	42"	44"	46"	48"	50"	52"	54"	56"	58"	60"
12" x 14"			1	67.20	2205	2975	36.00	53.05	50.40	48.00	45.82	43.83	42.00	40.32				
		35	2352	2905	3500	1960	1857	1764	1680	1604	1534	1470	1411					
		50	3360	3150	2800	2652	2520	2400	2291	2191	2100	2016						
		65	4368	4095	3650	3418	3276	3120	2978	2849	2730	2621						
		80	5376	5040	4480	4244	4062	3840	3655	3506	3360	3225						
		95	6384	5985	5364	5120	5040	4788	4560	4353	4164	3990	3830					
		110	7392	6930	6233	6100	5835	5544	5280	5040	4822	4620	4435					
		125	8400	7875	7113	7000	6652	6300	6000	5728	5479	5250	5040					
		140	9408	8820	8365	7840	7428	7036	6720	6415	6137	5880	5645					
12" x 16"			1	76.80	72.00	67.77	64.00	60.64	57.60	54.86	52.36	50.04	48.00	46.08	44.31	42.67	41.14	
		35	2688	2520	2372	2240	2122	2016	1920	1833	1751	1680	1613	1551	1493	1440		
		50	3840	3600	3388	3200	3032	2880	2743	2618	2502	2400	2304	2215	2133	2057		
		65	4992	4680	4405	4160	3941	3744	3563	3403	3252	3120	2995	2880	2773	2674		
		80	6144	5760	5421	5120	4851	4608	4388	4188	4003	3840	3686	3545	3413	3291		
		95	7296	6840	6438	6080	5760	5472	5211	4974	4754	4560	4377	4205	4054	3908		
		110	8448	7920	7455	7040	6670	6337	6035	5760	5505	5280	5070	4875	4694	4526		
		125	9601	9001	8472	8001	7580	7201	6858	6546	6256	6000	5760	5539	5334	5143		
		140	10750	10080	9488	8961	8490	8064	7681	7331	7006	6720	6452	6204	5974	5760		
12" x 18"			1	81.00	76.24	72.00	68.21	64.80	61.72	58.91	56.35	54.00	51.81	49.85	48.01	46.29		
		35	2835	2668	2520	2387	2268	2160	2062	1974	1890	1814	1745	1680	1620			
		50	4050	3812	3600	3410	3240	3086	2945	2817	2700	2592	2492	2400	2314			
		65	5264	4955	4680	4433	4212	4011	3829	3662	3509	3360	3240	3120	3008			
		80	6480	6099	5760	5456	5184	4937	4712	4508	4320	4147	3988	3840	3703			
		95	7695	7242	6840	6480	6155	5863	5596	5353	5130	4924	4735	4560	4397			
		110	8910	8386	7920	7504	7128	6790	6480	6199	5940	5702	5484	5280	5092			
		125	10120	9590	9000	8527	8100	7715	7364	7044	6750	6480	6231	6000	5786			
		140	11340	10670	10080	9550	9072	8641	8248	7889	7560	7258	6980	6720	6481			
12" x 20"			1	90.00	84.71	80.00	75.79	72.00	68.57	65.46	62.61	60.00	57.60	55.39	53.34	51.43	49.65	48.00
		35	3150	2964	2800	2652	2520	2400	2291	2191	2100	2016	1938	1867	1800	1737	1680	
		50	4500	4255	4000	3789	3700	3428	3273	3130	3000	2880	2769	2667	2571	2482	2400	
		65	5850	5506	5200	4926	4680	4456	4255	4069	3900	3743	3600	3467	3343	3227	3120	
		80	7200	6776	6400	6063	5760	5485	5236	5008	4800	4607	4431	4267	4114	3972	3840	
		95	8550	8047	7600	7290	6940	6574	6248	5948	5672	5420	5182	5067	4885	4716	4560	
		110	9900	9318	8800	8357	7920	7543	7201	6887	6600	6336	6093	5867	5657	5462	5280	
		125	11250	10590	10000	9474	9000	8571	8183	7827	7500	7200	6924	6667	6429	6206	6000	
		140	12600	11860	11200	10610	10080	9600	9165	8765	8400	8064	7755	7467	7200	6951	6720	

TABLE I.—(Continued).

TRACTIVE POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA.	STROKE	DIAMETER OF DRIVERS																			
				30"	32"	34"	36"	38"	40"	42"	44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	
13" x 16"																							
1	90.13	84.50	79.52	75.11	71.16	67.60	64.38	61.45	58.78	56.33	54.08	52.00	50.07	48.28	46.62	45.07							
35	3151	2957	2783	2628	2490	2366	2253	2150	2057	1971	1893	1820	1752	1690	1631	1577							
50	4506	4225	3976	3755	3558	3380	3219	3072	2938	2816	2704	2600	2503	2414	2331	2253							
65	5858	5492	5168	4882	4625	4394	4184	3994	3820	3661	3515	3380	3254	3138	3030	2929							
80	7210	6760	6361	6008	5692	5408	5150	4916	4702	4506	4326	4160	4005	3862	3729	3605							
95	8562	8027	7554	7135	6760	6422	6116	5837	5584	5351	5137	4940	4756	4586	4428	4281							
110	9914	9295	8747	8262	7828	7436	7082	6760	6466	6196	5949	5720	5508	5311	5128	4958							
125	11260	10560	9940	9389	8895	8450	8048	7681	7348	7041	6760	6500	6250	6035	5828	5634							
140	12620	11830	11130	10510	9962	9464	9014	8603	8229	7886	7571	7280	7010	6760	6527	6310							
13" x 18"																							
1	.....	95.06	89.47	84.50	80.05	76.05	72.43	69.14	66.13	63.38	60.84	58.50	56.34	54.32	52.45	50.70							
35	.....	3327	3132	2957	2801	2661	2535	2420	2314	2218	2129	2047	1972	1901	1835	1774							
50	.....	4735	4476	4225	4002	3802	3621	3457	3306	3163	3042	2925	2817	2716	2622	2535							
65	.....	6178	5815	5492	5203	4943	4707	4494	4298	4119	3954	3802	3662	3530	3409	3295							
80	.....	7604	7157	6760	6404	6084	5794	5531	5290	5070	4867	4680	4507	4345	4196	4056							
95	.....	9030	8499	8027	7604	7224	6880	6568	6282	6021	5779	5557	5352	5160	4982	4816							
110	.....	10450	9842	9295	8806	8366	7968	7606	7275	6972	6693	6435	6198	5975	5770	5577							
125	.....	11880	11180	10560	10000	9506	9054	8643	8267	7925	7613	7333	7083	6850	6637	6438							
140	.....	13310	12520	11830	11200	10640	10140	9680	9259	8873	8518	8190	7887	7605	7343	7098							
13" x 20"																							
1	.....	105.62	99.41	93.89	88.94	84.50	80.48	76.82	73.48	70.42	67.60	65.00	62.59	60.36	58.28	56.33							
35	.....	3697	3479	3286	3113	2957	2816	2688	2572	2464	2366	2275	2190	2112	2040	1971							
50	.....	5281	4970	4694	4447	4225	4021	3841	3674	3521	3380	3250	3129	3018	2914	2816							
65	.....	6866	6461	6103	5781	5492	5231	4993	4776	4577	4394	4225	4068	3923	3788	3661							
80	.....	8451	7953	7511	7115	6760	6438	6145	5878	5633	5408	5200	5007	4828	4662	4506							
95	.....	10030	9444	8919	8445	8027	7645	7298	6980	6690	6422	6175	5946	5734	5536	5351							
110	.....	11620	10950	10330	9784	9295	8853	8450	8083	7746	7436	7159	6905	6674	6461	6196							
125	.....	13290	12420	11730	11120	10560	10060	9603	9183	8805	8450	8125	7824	7545	7285	7041							
140	.....	14790	13920	13140	12450	11830	11290	10790	10320	9850	9464	9100	8765	8450	8160	7886							
13" x 22"																							
1	.....	.....	.....	103.29	97.85	92.96	88.53	84.50	80.83	77.47	74.36	71.51	68.86	66.40	64.11	61.97	59.97	58.10	56.34				
35	.....	.....	.....	3615	3425	3253	3098	2957	2829	2711	2602	2503	2410	2324	2245	2169	2099	2033	1972				
50	.....	.....	.....	5161	4892	4648	4426	4225	4041	3873	3718	3575	3443	3320	3205	3098	2998	2905	2817				
65	.....	.....	.....	6714	6360	6042	5754	5492	5253	5035	4833	4648	4476	4316	4167	4028	3898	3776	3662				
80	.....	.....	.....	8263	7827	7436	7082	6760	6466	6196	5949	5721	5508	5312	5128	4957	4797	4648	4507				
95	.....	.....	.....	9812	9295	8810	8410	8027	7678	7359	7064	6793	6541	6308	6090	5887	5697	5519	5352				
110	.....	.....	.....	11320	10760	10220	9709	9295	8901	8522	8180	7865	7575	7305	7052	6817	6597	6391	6198				
125	.....	.....	.....	12910	12230	11690	11200	10760	10360	10000	9681	9395	9129	8890	8644	8416	8194	7983	7783				
140	.....	.....	.....	14460	13760	13200	12690	12300	11930	11590	11310	11040	10810	10610	10410	10230	10060	9896	9743				
155	.....	.....	.....	16010	15160	14410	13720	13200	12800	12410	12010	11720	11480	11290	11100	10930	10760	10600	10440				

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRESS.	DIAMETER OF DRIVERS																
		DIA. STROKE																
		34"	36"	38"	40"	42"	44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"
14" x 18"																		
1	103.76	98.00	92.84	88.20	84.00	80.19	76.70	73.50	70.56	67.84	65.34	63.00	60.83	58.80	56.91	55.12	53.46	
35	3632	3430	3249	3087	2940	2806	2684	2572	2469	2374	2287	2205	2120	2058	1992	1929	1871	
50	5188	4900	4612	4410	4200	4009	3835	3675	3528	3392	3267	3150	3041	2940	2845	2756	2673	
65	6744	6370	6034	5733	5460	5212	4985	4777	4586	4400	4247	4095	3954	3822	3699	3583	3475	
80	8300	7840	7427	7056	6720	6415	6136	5880	5645	5427	5227	5040	4866	4704	4552	4400	4256	
95	9848	9310	8820	8378	7980	7618	7286	6982	6703	6444	6207	5985	5778	5586	5406	5226	5058	
110	11440	10780	10210	9703	9240	8821	8437	8086	7762	7462	7188	6930	6691	6468	6260	6064	5881	
125	12970	12250	11600	11020	10500	10020	9588	9188	8820	8486	8180	7894	7624	7360	7114	6880	6663	
140	14520	13720	13000	12350	11760	11220	10740	10300	9878	9498	9148	8820	8516	8232	7968	7717	7484	
155	16080	15190	14390	13670	13020	12430	11890	11390	10930	10510	10130	9765	9429	9115	8821	8544	8286	
14" x 20"																		
1	115.29	108.89	103.15	98.00	93.33	89.09	85.22	81.67	78.40	75.39	72.60	70.00	67.59	65.33	63.23	61.25	59.39	
35	4035	3811	3610	3430	3266	3118	2982	2858	2744	2638	2541	2450	2365	2286	2213	2143	2078	
50	5764	5444	5158	4900	4666	4454	4261	4083	3920	3769	3630	3500	3379	3266	3161	3062	2969	
65	7494	7077	6705	6370	6066	5790	5539	5308	5096	4901	4718	4550	4393	4246	4110	3981	3860	
80	9223	8710	8252	7840	7466	7127	6817	6533	6272	6031	5808	5600	5407	5226	5058	4900	4751	
95	10950	10340	9800	9310	8866	8463	8096	7758	7448	7162	6897	6650	6421	6206	6007	5818	5642	
110	12680	11980	11350	10780	10260	9800	9374	8984	8624	8293	7986	7700	7435	7187	6956	6738	6534	
125	14410	13610	12890	12250	11660	11130	10650	10210	9800	9424	9075	8750	8449	8167	7901	7656	7424	
140	16140	15240	14440	13720	13060	12470	11930	11430	10970	10550	10160	9800	9463	9147	8852	8575	8315	
155	17870	16870	15990	15190	14460	13810	13210	12660	12150	11680	11250	10850	10470	10130	9801	9494	9206	
14" x 22"																		
1	.....	119.78	113.47	107.79	102.67	98.01	93.74	89.84	86.24	82.92	79.85	77.00	74.34	71.87	69.55	67.38	65.33	
35	.....	4192	3971	3772	3593	3430	3281	3144	3018	2902	2794	2695	2602	2515	2434	2358	2286	
50	.....	5980	5673	5390	5134	4900	4687	4492	4312	4146	3992	3850	3717	3593	3477	3369	3266	
65	.....	7785	7375	7006	6673	6371	6093	5839	5605	5390	5190	5004	4832	4671	4520	4379	4246	
80	.....	9582	9078	8623	8214	7840	7499	7187	6899	6633	6388	6160	5947	5750	5564	5390	5226	
95	.....	11380	10780	10240	9734	9310	8905	8535	8197	7877	7585	7314	7062	6827	6607	6401	6206	
110	.....	13170	12480	11850	11290	10780	10310	9883	9487	9122	8784	8470	8178	7906	7651	7412	7187	
125	.....	14970	14180	13470	12830	12250	11720	11230	10780	10360	9982	9625	9293	8984	8694	8423	8167	
140	.....	16770	15880	15060	14370	13720	13120	12580	12070	11610	11180	10780	10410	10040	9737	9463	9147	
155	.....	18560	17590	16760	16010	15310	14630	14000	13390	12810	12270	11790	11330	10910	10510	10130	9765	
14" x 24"																		
1	.....	.....	123.80	117.60	112.00	106.90	102.28	98.01	94.08	90.47	87.12	84.00	81.11	78.40	75.88	73.51	71.28	
35	.....	.....	4333	4116	3920	3741	3579	3430	3283	3166	3049	2940	2839	2744	2655	2573	2495	
50	.....	.....	6190	5881	5600	5345	5113	4900	4704	4523	4356	4200	4055	3920	3794	3675	3564	
65	.....	.....	8047	7644	7280	6949	6647	6371	6115	5880	5663	5460	5272	5096	4932	4778	4633	
80	.....	.....	9904	9408	8960	8533	8131	7840	7526	7237	6969	6720	6488	6272	6070	5880	5702	
95	.....	.....	11760	11170	10640	10150	9715	9310	8926	8564	8226	7980	7765	7448	7208	6983	6772	
110	.....	.....	13620	12940	12520	12060	11660	11290	10950	10630	10320	10020	9740	9492	9264	9047	8847	
125	.....	.....	15470	14700	14200	13760	13360	12980	12630	12300	11990	11700	11430	11180	10940	10710	10490	
140	.....	.....	17330	16460	15860	15370	14920	14500	14100	13720	13370	13040	12730	12440	12160	11900	11650	
155	.....	.....	19190	18260	17460	16770	16300	15850	15430	15030	14650	14290	13950	13630	13330	13040	12760	

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA.	STROKE	DIAMETER OF DRIVERS																			
				34"	36"	38"	40"	42"	44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	
15" x 18"				1	119.10	112.50	106.58	101.25	96.42	92.04	88.04	84.37	81.00	77.88	75.00	72.32	69.83	67.50	65.32	63.28	61.36		
	35	4169	3938	3730	3543	3375	3221	3081	2953	2835	2726	2625	2531	2444	2362	2286	2215	2147					
	50	5953	5625	5329	5062	4821	4602	4402	4218	4050	3894	3750	3616	3492	3375	3266	3164	3068					
	65	7742	7313	6928	6581	6267	5982	5723	5484	5264	5062	4875	4700	4538	4387	4245	4113	3988					
	80	9529	9000	8526	8100	7712	7363	7043	6749	6480	6230	6000	5785	5586	5400	5225	5062	4908					
	95	11310	10690	10120	9618	9160	8744	8364	8015	7698	7398	7125	6870	6634	6412	6205	6012	5829					
	110	13100	12570	11920	11440	10900	10420	9985	9582	9201	8847	8520	8235	7985	7755	7530	7310	7100					
	125	14900	14360	13820	13280	12750	12250	11800	11340	10920	10530	10175	9855	9560	9290	9040	8790	8550					
	140	16670	16130	15590	15050	14520	14000	13500	13020	12580	12180	11810	11460	11130	10820	10530	10250	10000					
	155	18460	17940	17420	16900	16380	15860	15360	14870	14400	13950	13520	13100	12700	12320	11950	11600	11260					
15" x 20"				1	132.34	125.00	118.40	112.50	107.11	102.28	97.83	93.75	90.00	86.54	83.33	80.36	77.59	75.00	72.59	70.31	68.18		
	35	4632	4375	4144	3938	3750	3579	3424	3281	3150	3028	2916	2812	2715	2625	2540	2461	2386					
	50	6618	6250	5920	5625	5358	5114	4891	4687	4500	4327	4166	4018	3879	3750	3629	3515	3409					
	65	8603	8125	7697	7313	6965	6647	6359	6094	5850	5624	5416	5223	5043	4875	4718	4570	4431					
	80	10580	10000	9473	9000	8572	8182	7825	7500	7200	6923	6656	6428	6207	6000	5807	5624	5451					
	95	12570	11870	11250	10690	10180	9716	9283	8896	8550	8221	7916	7634	7370	7125	6896	6679	6477					
	110	14560	13750	13020	12370	11780	11250	10760	10310	9900	9520	9167	8840	8535	8250	7985	7735	7500					
	125	16540	15620	14890	14200	13590	13020	12500	12020	11580	11170	10780	10410	10060	9730	9425	9140	8875					
	140	18530	17500	16570	15750	15000	14320	13690	13120	12600	12110	11660	11250	10860	10500	10160	9844	9545					
	155	20510	19370	18350	17440	16610	15850	15160	14530	13950	13410	12910	12450	12020	11620	11250	10900	10570					
15" x 22"				1	137.50	130.25	123.73	117.84	112.50	107.60	103.11	99.00	95.19	91.67	88.39	85.34	82.50	79.84	77.34	75.00		
	35	.....	4812	4559	4331	4125	3938	3766	3609	3465	3331	3208	3093	2987	2887	2794	2707	2625				
	50	.....	6875	6513	6187	5893	5625	5380	5156	4950	4759	4583	4419	4267	4125	3992	3867	3750				
	65	.....	8938	8467	8044	7660	7313	6994	6703	6435	6187	5958	5745	5546	5362	5189	5027	4875				
	80	.....	11060	10420	9900	9428	9000	8618	8269	7950	7653	7371	7107	6857	6600	6357	6125	5900				
	95	.....	13260	12570	11950	11390	10890	10420	9996	9604	9243	8908	8597	8307	8037	7785	7547	7325				
	110	.....	15120	14330	13610	12960	12370	11830	11340	10890	10470	10080	9724	9387	9076	8783	8508	8250				
	125	.....	17190	16280	15470	14730	14060	13450	12890	12370	11900	11460	11050	10660	10310	9980	9675	9375				
	140	.....	19250	18240	17320	16500	15750	15060	14430	13860	13320	12830	12390	11950	11550	11180	10830	10500				
	155	.....	21310	20190	19180	18270	17440	16680	15980	15345	14750	14210	13700	13230	12790	12370	11990	11620				
15" x 24"				1	142.10	135.00	128.57	122.72	117.39	112.50	108.00	103.83	100.00	96.42	93.10	90.00	87.10	84.37	81.81	79.41	77.14
	35	4973	4725	4500	4296	4108	3938	3780	3634	3500	3375	3258	3150	3048	2953	2863	2779	2700			
	50	7105	6750	6429	6131	5869	5625	5390	5162	5000	4791	4655	4500	4355	4218	4080	3970	3857			
	65	9236	8775	8357	7978	7630	7313	7021	6749	6500	6267	6050	5841	5644	5451	5264	5104				
	80	11370	10800	10280	9818	9391	9000	8610	8307	8000	7712	7448	7200	6968	6749	6544	6353	6171			
	95	13500	12820	12240	11660	11150	10690	10260	9864	9500	9160	8844	8550	8274	8015	7772	7544	7328			
	110	15680	14850	14140	13500	12910	12370	11860	11380	10940	10520	10120	9740	9380	9040	8824	8616				
	125	17760	16870	16070	15340	14670	14060	13500	12980	12500	12050	11640	11250	10890	10550	10220	9926	9643			
	140	19890	18900	18000	17180	16430	15750	15120	14540	14000	13500	13030	12600	12190	11810	11450	11120	10800			
	155	22020	20920	19930	19020	18190	17440	16740	16090	15500	14940	14430	13950	13500	13070	12680	12350	12050			

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRESS.	DIAMETER OF DRIVERS																			
		DIA. STROKE																			
		36"	38"	40"	42"	44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"		
16" x 20"																					
1	142.20	134.72	128.00	121.90	116.34	111.39	106.67	102.40	98.46	94.82	91.43	88.27	85.33	82.58	80.00	77.57	75.30	73.14	71.00	68.86	66.72
35	4977	4715	4480	4266	4072	3896	3733	3584	3446	3318	3200	3089	2986	2890	2800	2715	2635	2560	2489	2422	2357
50	7110	6737	6400	6065	5817	5565	5333	5120	4923	4741	4571	4413	4266	4129	4000	3878	3765	3657	3553	3453	3357
65	9243	8737	8320	7924	7583	7255	6933	6635	6360	6103	5863	5637	5426	5237	5060	4902	4751	4605	4464	4327	4194
80	11370	10780	10240	9752	9308	8904	8533	8192	7876	7583	7314	7062	6826	6606	6400	6205	6021	5851	5684	5521	5361
95	13510	12800	12160	11580	11050	10570	10130	9728	9353	9007	8685	8385	8106	7845	7600	7369	7153	6951	6761	6583	6416
110	15640	14820	14080	13410	12800	12240	11730	11260	10830	10433	10060	9711	9386	9085	8800	8533	8283	8046	7821	7607	7404
125	17770	16840	16000	15240	14540	13890	13290	12730	12210	11720	11260	10830	10433	10060	9711	9386	9085	8800	8533	8283	8046
140	19910	18860	17920	17070	16290	15580	14930	14320	13750	13220	12720	12240	11780	11340	10920	10520	10140	9780	9430	9090	8760
155	22040	20880	19840	18800	17890	17000	16230	15570	14940	14340	13770	13220	12720	12240	11780	11340	10920	10520	10140	9780	9430
170	24170	22900	21760	20720	19780	18920	18130	17410	16740	16120	15540	15000	14480	13980	13500	13040	12600	12180	11780	11390	11010
16" x 22"																					
1	148.20	140.80	134.10	128.00	122.42	117.32	112.62	108.31	104.29	100.58	97.19	93.85	90.84	88.00	85.33	82.83	80.45	78.18	76.00	73.92	71.94
35	5187	4928	4697	4480	4285	4107	3942	3792	3650	3520	3398	3285	3179	3080	2986	2898	2815	2736	2660	2587	2517
50	7110	7040	6765	6400	6122	5867	5632	5416	5218	5028	4845	4683	4542	4420	4296	4181	4069	3960	3854	3751	3651
65	9033	9132	8710	8240	7958	7687	7431	7191	6966	6754	6554	6363	6181	6004	5840	5686	5542	5400	5260	5123	4989
80	11080	11260	10720	10240	9795	9387	9011	8655	8313	8004	7716	7549	7267	7040	6826	6625	6436	6250	6067	5887	5710
95	13000	13370	12750	12160	11630	11140	10700	10290	9907	9554	9224	8917	8630	8360	8106	7867	7642	7430	7221	7015	6812
110	15000	15490	14750	14080	13470	12910	12390	11910	11470	11060	10680	10320	9982	9680	9386	9100	8850	8610	8380	8160	7950
125	17000	17600	16760	16000	15300	14670	14080	13540	13030	12570	12140	11730	11350	11000	10660	10350	10050	9760	9480	9210	8950
140	19070	19710	18770	17920	17140	16430	15770	15160	14590	14060	13560	13140	12720	12320	11940	11590	11260	10940	10630	10330	10040
155	21070	21820	20780	19840	18980	18190	17460	16810	16160	15550	15000	14530	14080	13640	13220	12830	12470	12120	11780	11460	11150
170	23100	23940	22800	21760	20810	19950	19150	18400	17730	17090	16530	15950	15450	14960	14500	14080	13670	13270	12880	12500	12130
16" x 24"																					
1	153.60	146.20	139.62	133.56	128.00	122.88	118.15	113.78	109.71	105.92	102.40	99.10	95.00	93.40	90.36	87.77	85.30	82.83	80.45	78.18	76.00
35	5376	5120	4887	4675	4480	4301	4135	3982	3840	3708	3584	3468	3360	3258	3162	3072	2986	2903	2822	2743	2666
50	7080	7314	6987	6678	6400	6144	5908	5686	5486	5297	5120	4955	4800	4654	4518	4385	4255	4127	4001	3877	3755
65	9084	9591	9072	8682	8320	7985	7680	7395	7132	6886	6655	6442	6240	6051	5873	5705	5540	5378	5219	5063	4910
80	11290	11700	11170	10680	10240	9830	9453	9102	8777	8475	8192	7928	7680	7447	7228	7021	6817	6616	6418	6223	6031
95	13490	13890	13260	12680	12160	11670	11220	10810	10420	10070	9758	9464	9190	8943	8700	8468	8238	8010	7785	7563	7344
110	15690	16090	15360	14690	14080	13520	13000	12510	12070	11650	11260	10900	10560	10240	9940	9656	9376	9100	8828	8560	8296
125	17890	18290	17450	16690	16000	15360	14770	14220	13710	13240	12800	12390	12000	11630	11290	10970	10650	10340	10030	9720	9410
140	19990	20480	19530	18760	17920	17200	16540	15930	15360	14820	14330	13870	13440	13030	12650	12290	11940	11600	11260	10930	10600
155	22190	22670	21640	20760	19840	19040	18310	17630	17010	16420	15870	15360	14880	14430	14000	13600	13220	12860	12510	12170	11840
170	24390	24870	23740	22700	21760	20890	20060	19340	18650	18010	17410	16850	16320	15820	15340	14880	14430	14000	13600	13220	12860
16" x 26"																					
1	158.47	151.28	144.70	138.67	133.11	128.00	123.26	118.85	114.76	110.92	107.35	104.00	100.85	97.89	95.09	92.38	89.76	87.23	84.79	82.44	80.18

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA.	STROKE	DIAMETER OF DRIVERS																							
				38"	40"	42"	44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"				
17" x 20"																											
1	132.10	144.50	137.61	131.38	125.65	120.41	115.60	111.16	107.02	103.20	99.65	96.34	93.22	90.32	87.57	85.00	82.57										
50	7605	7225	6881	6568	6283	6021	5780	5558	5352	5160	4982	4817	4661	4516	4378	4250	4128										
65	9887	9393	8915	8546	8168	7827	7514	7226	6957	6708	6477	6261	6050	5870	5692	5525	5367										
80	12170	11560	11010	10510	10050	9634	9248	8893	8563	8255	7972	7707	7457	7225	7005	6800	6605										
95	14450	13790	13070	12480	11930	11440	10980	10560	10170	9805	9465	9152	8856	8580	8319	8075	7841										
110	16730	15890	15140	14450	13820	13240	12720	12250	11770	11350	10960	10600	10250	9935	9633	9350	9083										
125	19010	18060	17270	16620	16120	15710	15360	15030	14720	14430	14150	13890	13640	13400	13170	12950	12740										
140	21290	20230	19270	18590	17930	17300	16800	16480	16180	15900	15640	15400	15170	14950	14740	14540	14350										
155	23570	22400	21330	20360	19480	18690	17920	17290	16790	16300	15900	15540	15200	14900	14630	14370	14120										
170	25860	24560	23390	22330	21360	20470	19650	18900	18290	17740	17240	16800	16390	16000	15630	15280	14950										
185	28140	26730	25460	24300	23280	22380	21500	20650	19800	19000	18260	17540	16840	16200	15600	15020	14460										
17" x 22"																											
1	158.94	151.38	144.50	138.21	132.45	127.16	122.28	117.72	113.52	109.61	105.97	102.52	99.34	96.34	93.50	90.83											
50	7948	7569	7225	6911	6623	6358	6114	5887	5677	5481	5298	5127	4967	4817	4675	4541											
65	10230	9840	9393	8985	8610	8265	7947	7653	7380	7126	6888	6664	6457	6262	6077	5903											
80	12710	12110	11560	11060	10580	10170	9781	9420	9083	8770	8477	8202	7947	7707	7480	7268											
95	15100	14530	13870	13280	12740	12250	11820	11410	11010	10620	10240	9870	9540	9220	8910	8610											
110	17480	16850	16190	15590	15000	14450	13940	13450	12980	12540	12120	11720	11340	10980	10630	10280											
125	19870	19120	18360	17690	17080	16500	15940	15400	14880	14380	13900	13430	12980	12540	12110	11690											
140	22250	21400	20620	19850	19120	18450	17800	17260	16740	16240	15750	15280	14820	14370	13930	13500											
155	24640	23760	22940	22120	21300	20500	19710	18950	18250	17600	16990	16420	15880	15360	14850	14360											
170	27020	25730	24560	23580	22670	21830	21050	20300	19590	18900	18300	17730	17180	16650	16140	15640											
185	29400	28000	26730	25950	25170	24500	23800	23100	22400	21700	21000	20300	19600	18900	18200	17500											
17" x 24"																											
1	165.12	157.62	150.78	144.50	138.71	133.38	128.43	123.84	119.59	115.60	111.87	108.38	105.00	102.00	99.08	96.33	93.73	91.26									
50	8237	7882	7539	7225	6936	6669	6422	6193	5979	5780	5594	5419	5255	5100	4951	4816	4686	4563									
65	10510	10240	9800	9393	9017	8670	8348	8051	7753	7514	7272	7041	6831	6630	6440	6261	6092	5932									
80	12790	12610	12060	11560	11090	10670	10270	9908	9567	9248	8950	8670	8407	8160	7926	7706	7498	7300									
95	15070	14870	14320	13780	13260	12760	12280	11820	11380	10960	10550	10160	9790	9430	9080	8840	8610	8390									
110	17350	17140	16580	15980	15400	14840	14300	13780	13280	12790	12310	11840	11390	10950	10520	10100	9690	9412									
125	19630	19400	18830	18200	17600	17030	16480	15950	15440	14940	14450	13980	13530	13090	12660	12240	11830	11440									
140	21910	22070	21110	20230	19420	18670	17900	17340	16740	16180	15660	15170	14710	14280	13870	13480	13120	12770									
155	24190	24360	23370	22400	21500	20670	19910	19200	18530	17920	17340	16800	16290	15810	15340	14890	14460	14040									
170	26470	26800	25630	24560	23580	22670	21830	21050	20330	19650	19020	18420	17860	17340	16840	16370	15930	15510									
185	28750	29160	27890	26730	25660	24670	23760	22910	22120	21390	20700	20050	19440	18870	18330	17820	17340	16890									

TABLE I.—(Continued).
 TRACTIVE POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA.	STROKE	DIAMETER OF DRIVERS																	
				44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"
17" x 26"				1	170.77	163.34	156.52	150.28	144.50	139.13	134.18	129.54	125.22	121.19	117.40	113.84	110.50	107.32	104.36	101.53	98.87
	50			8389	8168	7927	7514	7225	6957	6709	6478	6262	6060	5870	5692	5525	5367	5218	5077	4943	
	65			11100	10620	10170	9768	9393	9045	8721	8421	8141	7877	7632	7400	7183	6977	6784	6600	6427	
	80			13660	13070	12520	12020	11530	11030	10560	10120	9695	9282	8880	8498	8135	7790	7462	7150	6853	
	95			16220	15520	14870	14270	13730	13220	12740	12290	11860	11450	11050	10670	10300	9940	9600	9270	8950	
	110			18780	17970	17220	16530	15890	15300	14760	14250	13760	13280	12810	12350	11910	11480	11070	10670	10280	
	125			21350	20420	19570	18780	18060	17390	16770	16190	15650	15130	14620	14120	13630	13150	12680	12230	11790	
	140			23910	22870	21920	21040	20220	19480	18780	18140	17550	16990	16460	15940	15430	14930	14440	13960	13490	
	155			26470	25320	24360	23500	22720	22000	21370	20800	20260	19740	19240	18750	18280	17820	17370	16930	16500	
	170			29030	27770	26710	25840	25060	24380	23790	23240	22720	22200	21690	21200	20720	20260	19810	19370	18940	
	185			31590	30220	29060	27900	26930	26060	25280	24590	23900	23210	22520	21830	21140	20460	19780	19100	18430	
17" x 28"				1	175.90	168.58	161.82	155.60	149.82	144.50	139.50	134.86	130.50	126.42	122.60	119.00	115.60	112.39	109.34	106.47	103.72
	65			11430	10960	10520	10110	9740	9393	9068	8766	8483	8218	7970	7735	7514	7305	7108	6920	6743	
	80			14070	13480	12940	12450	11990	11560	11160	10790	10440	10110	9808	9520	9248	8991	8748	8517	8290	
	95			16710	16010	15370	14780	14230	13730	13250	12810	12400	12010	11630	11270	10930	10600	10280	10000	9720	
	110			19350	18540	17800	17120	16480	15890	15340	14830	14350	13900	13470	13060	12670	12300	11940	11600	11270	
	125			21990	21070	20230	19450	18730	18060	17440	16860	16310	15800	15320	14870	14450	14050	13670	13310	12970	
	140			24630	23600	22660	21780	20960	20220	19530	18880	18270	17700	17160	16660	16180	15720	15280	14850	14450	
	155			27270	26130	25080	24120	23220	22400	21620	20900	20230	19600	19000	18440	17920	17420	16930	16450	16000	
	170			29900	28660	27510	26450	25470	24560	23710	22920	22180	21490	20820	20180	19560	18960	18380	17820	17300	
	185			32540	31180	29940	28790	27720	26730	25810	24950	24140	23380	22680	22000	21350	20730	20130	19550	18990	
	200			35180	33710	32350	31120	29970	28900	27900	26970	26100	25280	24520	23800	23120	22480	21870	21280	20740	
17" x 30"				1	180.62	173.40	166.72	160.56	154.80	149.49	144.50	139.82	135.48	131.35	127.50	123.84	120.41	117.15	114.09	111.14	
	65			11740	11270	10840	10430	10060	9717	9393	9090	8805	8538	8288	8051	7827	7615	7415	7225	7044	
	80			14450	13870	13340	12840	12380	11960	11560	11180	10840	10510	10200	9908	9634	9372	9127	8892	8667	
	95			17160	16470	15840	15250	14700	14200	13730	13280	12870	12480	12110	11760	11430	11110	10800	10500	10210	
	110			19870	19070	18340	17660	17030	16440	15890	15380	14900	14450	14020	13600	13200	12820	12460	12120	11790	
	125			22580	21670	20840	20070	19350	18680	18060	17480	16930	16420	15940	15480	15050	14630	14230	13840	13460	
	140			25290	24280	23440	22680	22000	21370	20780	20220	19680	19160	18660	18180	17720	17280	16850	16430	16020	
	155			28000	26880	25840	24880	23990	23170	22400	21670	21000	20390	19800	19240	18700	18180	17680	17190	16710	
	170			30710	29480	28340	27290	26320	25410	24560	23770	23030	22330	21670	21050	20470	19920	19390	18880	18390	
	185			33420	32080	30840	29700	28640	27650	26730	25870	25060	24300	23580	22910	22280	21670	21070	20500	19950	
	200			36120	34680	33340	32110	30960	29900	28900	27960	27090	26270	25500	24770	24080	23420	22800	22200	21620	

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS MEAN
EFF.
PRES.

DIA. STROKE

18" x 22"

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155

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TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIAMETER OF DRIVERS																									
		DIA.		STROKE		46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"		
		18" x 28"																									
1	197.20	189.00	181.42	174.46	168.00	162.00	156.40	151.20	146.31	141.73	137.44	133.40	129.60	126.00	122.50	119.46											
65	12820	12280	11790	11340	10920	10530	10170	9828	9511	9213	8934	8672	8424	8190	7969	7765											
80	15770	15120	14510	13950	13440	12960	12510	12090	11700	11340	11000	10670	10370	10080	9807	9537											
95	18730	17950	17230	16570	15960	15390	14860	14360	13890	13450	13040	12670	12310	11970	11640	11330											
110	21690	20790	19960	19190	18480	17820	17200	16630	16100	15590	15120	14670	14260	13860	13480	13140											
125	24650	23620	22680	21810	21000	20250	19550	18900	18290	17720	17180	16670	16200	15750	15320	14930											
140	27610	26460	25400	24420	23520	22680	21900	21170	20480	19840	19240	18680	18140	17640	17160	16720											
155	30570	29290	28130	27040	26060	25200	24360	23540	22800	22170	21560	20980	20430	19900	19390	18910											
170	33530	32130	30840	29660	28560	27540	26590	25760	24960	24200	23490	22800	22130	21490	20880	20300											
185	36480	34980	33560	32270	31080	29970	28930	27970	27070	26220	25430	24680	23970	23300	22650	22040											
200	39440	37840	36280	34890	33600	32400	31280	30240	29260	28340	27460	26620	25820	25060	24330	23630											
215	42400	40620	38910	37310	35800	34390	33070	31830	30740	29670	28730	27830	26960	26120	25310	24530											
230	45360	43470	41730	40130	38640	37260	35970	34770	33600	32460	31460	30480	29520	28580	27670	26790											
18" x 30"																											
1	202.50	194.40	186.90	180.00	173.56	167.57	162.00	156.78	151.88	147.27	142.93	138.84	135.00	131.33	127.90	124.60	121.50	118.52	115.70								
65	13160	12630	12150	11700	11280	10890	10530	10190	9872	9573	9291	9025	8775	8537	8314	8100	7897	7705	7521								
80	16200	15530	14950	14400	13880	13400	12960	12540	12150	11780	11430	11100	10800	10500	10230	9968	9720	9483	9256								
95	19240	18460	17750	17100	16480	15920	15390	14890	14430	13990	13580	13190	12820	12470	12150	11830	11540	11260	10990								
110	22270	21380	20560	19800	19100	18430	17820	17240	16700	16200	15720	15270	14850	14450	14070	13700	13360	13040	12730								
125	25310	24300	23360	22500	21690	20950	20250	19600	18980	18410	17870	17350	16870	16420	15990	15570	15190	14820	14460								
140	28350	27210	26170	25200	24300	23460	22680	21950	21260	20620	20010	19440	18900	18380	17900	17440	17010	16590	16200								
155	31380	30130	28970	27900	26900	25970	25110	24300	23540	22820	22150	21520	20920	20360	19820	19310	18830	18370	17930								
170	34420	33050	31770	30600	29500	28480	27540	26650	25800	25000	24240	23530	22850	22200	21570	21080	20620	20150	19670								
185	37460	35960	34570	33300	32110	31000	29970	29000	28060	27240	26440	25680	24950	24250	23580	22940	22330	21740	21180								
200	40500	38880	37380	36000	34710	33510	32400	31350	30370	29450	28580	27770	27000	26260	25560	24890	24240	23600	22980								
215	43530	41800	40180	38700	37310	36030	34830	33700	32650	31660	30730	29850	29020	28240	27500	26790	26120	25480	24870								
230	46570	44710	42900	41400	39920	38540	37260	36000	34830	33670	32570	31510	30490	29520	28580	27670	26790	25940	25100								
18" x 32"																											
1	207.33	199.33	191.99	185.11	178.72	172.79	167.20	162.00	157.07	152.45	148.10	143.98	140.09	136.40	132.90	129.60	126.42	123.41									
65	13470	12960	12480	12030	11620	11230	10870	10530	10210	9910	9627	9358	9106	8865	8638	8424	8218	8022									
80	16380	15840	15360	14910	14480	14070	13670	13290	12930	12590	12260	11940	11630	11330	11040	10760	10490	10230									
95	19300	18740	18240	17780	17350	16930	16530	16140	15760	15400	15040	14690	14360	14040	13730	13430	13140	12860	12590								
110	22310	21730	21210	20730	20280	19840	19410	18990	18580	18180	17790	17420	17060	16720	16390	16070	15760	15460	15170								
125	25320	24720	24200	23740	23300	22870	22450	22040	21640	21250	20870	20500	20130	19770	19420	19080	18750	18420	18100								
140	28330	27710	27190	26680	26180	25690	25200	24720	24250	23800	23360	22930	22510	22100	21700	21310	20930	20560	20200								
155	31340	30700	30080	29460	28860	28270	27690	27120	26560	26010	25470	24940	24420	23910	23410	22920	22440	21970	21510								
170	34350	33690	33050	32410	31780	31160	30550	29950	29360	28780	28210	27650	27100	26560	26030	25510	25000	24490	24000								
185	37360	36680	35980	35290	34620	33960	33310	32670	32040	31420	30810	30210	29620	29040	28480	27930	27390	26860	26330								
200	40370	39680	38960	38260	37570	36890	36220	35560	34910	34270	33640	33020	32400	31790	31190	30600	30010	29430	28860								
215	43380	42680	41970	41280	40590	39910	39240	38580	37930	37280	36640	36000	35360	34730	34100	33480	32860	32250	31650								
230	46390	45680	44970	44280	43590	42910	42240	41570	40910	40260	39610	38960	38320	37680	37050	36420	35800	35180	34570								

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRESS.	DIAMETER OF DRIVERS																					
		DIA. STROKE																					
		44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"	
19" x 24"		1	196.99	188.33	180.50	173.28	166.60	160.44	154.70	149.37	144.39	139.73	135.38	131.27	127.41	123.77	120.32	117.08	114.00	111.08	108.30	105.64	103.12
65		12800	12240	11731	11260	10830	10430	10050	9710	9384	9084	8799	8533	8282	8045	7822	7610	7410	7220	7040	6867	6701	
80		15780	15060	14440	13860	13330	12830	12370	11950	11550	11180	10830	10500	10190	9901	9627	9365	9120	8886	8654	8432	8250	
95		18700	17890	17147	16460	15830	15240	14680	14150	13670	13220	12800	12410	12040	11730	11430	11120	10830	10550	10290	10040	9798	
110		21660	20720	19957	19260	18630	18050	17500	16980	16490	16030	15600	15190	14800	14440	14120	13820	13540	13280	13030	12790	12560	
125		24610	23540	22563	21660	20830	20060	19340	18670	18050	17470	16920	16410	15930	15470	15040	14630	14250	13890	13540	13200	12880	
140		27570	26370	25270	24260	23320	22460	21660	20910	20210	19560	18950	18380	17840	17330	16850	16390	15950	15530	15130	14740	14410	
155		30520	29190	27979	26840	25820	24870	23980	23150	22380	21660	20980	20350	19770	19180	18630	18100	17600	17220	16790	16380	15980	
170		33470	32080	30866	29690	28520	27480	26500	25580	24720	23910	23140	22410	21720	21060	20440	19860	19320	18810	18310	17830	17380	
195		36430	34840	33393	32000	30820	29680	28620	27630	26700	25830	25040	24320	23650	23020	22430	21880	21360	20860	20380	19940	19540	
200		39380	37690	36108	34650	33320	32040	30840	29870	28920	28000	27120	26280	25480	24720	24000	23320	22680	22100	21600	21100	20620	
215		42330	40490	38808	37250	35820	34490	33260	32110	31040	30040	29100	28220	27380	26610	25870	25170	24510	23880	23280	22710	22170	
230		45280	43220	41290	39530	37920	36380	34930	33580	32310	31130	30100	29130	28220	27360	26560	25820	25120	24450	23820	23220	22650	
19" x 26"		1	.....	204.05	195.53	187.71	180.50	173.81	167.60	161.82	156.42	151.38	146.66	142.21	138.03	134.08	130.36	126.83	123.50	120.32	117.32	114.47	111.73
65		13260	12710	12200	11730	11300	10890	10520	10170	9840	9533	9244	8973	8715	8473	8244	8028	7822	7627	7440	7264	
80		16220	15640	15100	14640	14240	13890	13570	13260	12960	12680	12410	12160	11920	11700	11490	11300	11120	10940	10770	10610	
95		19280	18570	17890	17140	16510	15920	15370	14860	14380	13930	13510	13110	12730	12380	12050	11730	11430	11140	10870	10610	
110		22450	21510	20650	19850	19120	18440	17800	17210	16650	16130	15640	15180	14750	14340	13950	13580	13240	12910	12590	12290	
125		25510	24440	23460	22560	21730	20950	20230	19560	18930	18330	17780	17250	16760	16290	15850	15440	15040	14670	14310	13970	
140		28570	27380	26280	25270	24330	23460	22660	21910	21200	20530	19910	19330	18770	18250	17760	17290	16850	16430	16020	15640	
155		31630	30310	29100	27980	26980	25980	25080	24280	23480	22720	22040	21400	20780	20200	19660	19140	18650	18190	17740	17320	
170		34690	33240	31910	30680	29530	28480	27510	26590	25730	24930	24180	23470	22790	22160	21560	20990	20450	19950	19460	18990	
185		37750	36170	34720	33390	32160	31000	29940	28940	28000	27130	26310	25540	24800	24120	23460	22830	22250	21710	21170	20670	
200		40810	39100	37540	36100	34760	33520	32360	31280	30270	29330	28440	27600	26810	26070	25360	24700	24080	23460	22890	22340	
215		43870	42040	40390	38810	37370	36030	34790	33630	32540	31530	30570	29630	28820	28030	27270	26550	25870	25220	24610	24020	
230		46930	44970	43180	41520	39980	38530	37220	35960	34810	33730	32720	31770	30830	29980	29170	28410	27680	26990	26320	25700	
19" x 28"		1	.....	210.57	202.43	194.37	187.17	180.50	174.26	168.46	163.01	157.91	153.13	148.62	144.39	140.39	136.59	132.99	129.60	126.35	123.25	120.32	
65		13690	13140	12630	12160	11730	11320	10950	10620	10300	10000	9710	9433	9162	8904	8658	8424	8191	7968	7746	7524	
80		16840	16170	15530	14970	14440	13940	13470	13040	12630	12230	11840	11460	11090	10730	10380	10040	9710	9386	9067	8752	
95		20000	19200	18460	17780	17140	16530	15940	15380	14840	14320	13820	13340	12870	12420	11970	11540	11120	10710	10310	9920	
110		23160	22230	21420	20630	19850	19170	18500	17850	17330	16830	16350	15880	15440	15000	14560	14130	13710	13300	12900	12510	
125		26320	25270	24260	23460	22690	22000	21340	20710	20100	19500	18920	18360	17820	17300	16780	16280	15790	15310	14840	14400	
140		29480	28390	27210	26290	25520	24790	24090	23420	22780	22160	21560	20980	20420	19880	19360	18860	18370	17890	17420	16960	
155		32640	31390	30120	29010	27980	27010	26070	25160	24280	23430	22600	21790	21000	20230	19480	18750	18040	17340	16660	16000	
170		35800	34390	32960	31640	30460	29320	28220	27160	26130	25120	24140	23180	22250	21340	20460	19600	18760	17940	17130	16350	
185		38950	37380	35760	34260	32880	31540	30340	29180	28060	26980	25940	24930	23950	23000	22080	21180	20300	19450	18630	17830	
200		42110	40420	38670	37040	35490	34000	32640	31320	30040	28800	27600	26440	25320	24240	23190	22160	21160	20180	19250	18350	
215		45270	43460	41780	40240	38750	37340	36000	34720	33480	32260	31080	29940	28840	27770	26720	25690	24680	23690	22720	21780	
230		48430	46490	44700	43060	41520	40080	38750	37490	36320	35160	34020	32920	31850	30800	29760	28740	27760	26790	25840	24900	

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA.	STROKE	DIAMETER OF DRIVERS																	
				50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"
19" x 30"				216.00	208.28	200.38	193.40	186.72	180.30	174.69	169.22	164.09	159.28	154.70	150.41	146.34	142.50	138.84	135.38	132.08	128.92
65	14080	13540	13040	12570	12140	11730	11350	11000	10660	10350	10050	9777	9513	9263	9026	8799	8585	8380			
80	17530	16690	16040	15470	14940	14440	13970	13540	13120	12740	12370	12030	11710	11400	11110	10830	10560	10310			
95	20570	19780	19050	18370	17740	17140	16590	16070	15590	15130	14690	14260	13850	13450	13060	12680	12340	12020			
110	23630	22910	22260	21670	21120	20540	19980	19450	18940	18450	17970	17500	17040	16600	16170	15760	15360	14980			
125	26700	26030	25400	24770	24180	23640	23090	22560	22040	21530	21030	20540	20060	19600	19150	18710	18280	17860			
140	30020	29160	28480	27800	27140	26520	25930	25360	24800	24260	23740	23230	22730	22240	21760	21290	20830	20380			
155	33570	32580	31690	30970	30280	29620	28980	28360	27760	27180	26620	26070	25540	25020	24510	24010	23520	23040			
170	38290	37100	36080	35270	34470	33690	32930	32190	31470	30760	30060	29380	28720	28070	27430	26800	26180	25580			
185	43020	41650	40410	39680	38940	38220	37510	36820	36140	35480	34840	34220	33620	33030	32450	31880	31320	30780			
200	48270	46780	45450	44340	43400	42500	41620	40760	40000	39260	38540	37840	37160	36500	35850	35310	34680	34080			
215	53820	52150	50650	49350	48250	47250	46350	45480	44640	43820	43020	42240	41480	40740	40020	39300	38600	37920			
230	60570	58720	57000	55450	54050	52750	51550	50380	49240	48120	47020	45940	44880	43840	42820	41820	40840	39880			
19" x 32"				222.18	213.98	206.30	199.20	192.56	186.33	180.50	175.03	169.90	165.04	160.44	156.10	152.00	148.10	144.40	140.88	137.52	
65	14440	13910	13410	12950	12510	12110	11730	11380	11040	10730	10430	10150	9880	9620	9384	9157	8940				
80	17770	17120	16590	16090	15620	15180	14760	14360	13970	13600	13240	12900	12580	12280	11990	11720	11460				
95	21100	20320	19600	18920	18280	17670	17140	16630	16140	15680	15240	14820	14420	14030	13650	13280	12930				
110	24440	23530	22690	21910	21180	20490	19830	19250	18690	18160	17650	17170	16720	16290	15880	15480	15100				
125	27770	26740	25790	24900	24070	23290	22560	21850	21240	20630	20040	19460	18910	18370	17850	17340	16840				
140	31100	29950	28880	27890	26960	26090	25270	24500	23780	23110	22460	21830	21230	20650	20090	19540	19010				
155	34440	33100	31890	30870	29840	28880	27950	27130	26350	25600	24870	24160	23470	22800	22150	21520	20900				
170	37770	36370	35070	33850	32730	31680	30680	29730	28800	27900	27020	26150	25300	24460	23640	22840	22060				
185	41100	39580	38170	36850	35620	34470	33380	32350	31430	30530	29680	28880	28120	27400	26710	26040	25400				
200	44430	42890	41460	39840	38510	37260	36100	35000	33980	33010	32090	31220	30400	29620	28880	28170	27500				
215	47770	46000	44550	42890	41400	40060	38810	37630	36530	35480	34490	33560	32680	31840	31040	30220	29570				
230	51100	49210	47450	45820	44300	42850	41420	40060	38970	37960	37000	36090	35230	34400	33600	32820	32100				
19" x 34"				227.32	219.20	211.64	204.60	198.00	191.89	186.19	180.89	175.96	170.49	165.48	161.51	157.38	153.43	149.70	146.12		
65	14770	14250	13750	13290	12870	12480	12100	11730	11380	11040	10730	10430	10150	9880	9620	9384	9157	8940			
80	18180	17530	16930	16370	15840	15340	14850	14380	13930	13490	13070	12670	12290	11930	11590	11270	10960				
95	21530	20820	20100	19430	18810	18220	17650	17110	16600	16090	15600	15120	14660	14230	13820	13430	13050				
110	25010	24110	23280	22510	21780	21100	20460	19850	19260	18690	18140	17600	17070	16560	16070	15590	15130				
125	28420	27400	26450	25570	24750	23970	23230	22520	21840	21170	20520	19880	19260	18660	18080	17510	16960				
140	31820	30690	29630	28640	27720	26850	26000	25270	24560	23870	23200	22540	21900	21280	20680	20100	19540				
155	35230	33970	32800	31710	30690	29730	28830	27980	27160	26360	25580	24820	24080	23360	22660	22000	21360				
170	38630	37260	35980	34780	33650	32580	31600	30680	29810	28970	28160	27370	26600	25840	25100	24380	23680				
185	42040	40530	39130	37830	36530	35480	34490	33560	32680	31840	31040	30220	29400	28620	27880	27170	26480				
200	45460	43840	42350	40920	39500	38300	37200	36140	35120	34140	33190	32260	31360	30480	29620	28780	27960				
215	48870	47130	45500	43980	42570	41230	39990	38810	37660	36540	35460	34400	33360	32340	31340	30360	29400				
230	52280	50420	48680	47050	45540	44110	42780	41520	40330	39210	38150	37120	36120	35140	34180	33240	32320				

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIAMETER OF DRIVERS																				
		44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"
		20" x 24"																				
1	218.18	208.69	200.00	192.00	184.60	177.78	171.41	165.50	160.00	154.84	150.00	145.45	141.18	137.14	133.33	129.72	126.32	123.08	120.00	117.08	114.29	111.63
65	14180	13560	13000	12480	12000	11550	11140	10760	10400	10060	9750	9454	9176	8914	8667	8432	8212	8000	7800	7610	7428	7254
80	17450	16690	16000	15360	14770	14220	13710	13240	12800	12390	12000	11630	11290	10970	10670	10380	10100	9840	9600	9380	9180	8990
95	20720	19830	19000	18240	17530	16860	16280	15740	15240	14760	14300	13860	13440	13030	12650	12290	11950	11630	11320	11030	10750	10480
110	24000	22950	22000	21120	20310	19560	18860	18200	17600	17030	16500	16000	15530	15090	14680	14290	13920	13570	13240	12930	12630	12340
125	27270	26080	25000	24000	23070	22220	21430	20690	20000	19360	18760	18180	17630	17100	16600	16120	15660	15220	14800	14400	14000	13600
140	30540	29210	28000	26880	25840	24890	24000	23170	22400	21680	21000	20360	19760	19180	18630	18100	17590	17100	16620	16160	15720	15300
155	33820	32340	31000	29760	28610	27550	26570	25630	24800	24000	23240	22520	21830	21160	20520	19900	19300	18720	18160	17620	17100	16600
170	37090	35470	34000	32640	31430	30260	29140	28130	27200	26320	25480	24680	23900	23140	22410	21700	21020	20360	19720	19100	18500	17900
185	40360	38690	37000	35520	34260	33090	31940	30890	29900	28960	28060	27190	26350	25540	24760	23990	23240	22500	21780	21080	20400	19720
200	43630	41780	40000	38400	36920	35530	34280	33100	31960	30860	29790	28750	27740	26760	25800	24860	23940	23040	22160	21300	20460	19640
215	46910	44860	43000	41280	39820	38450	37120	35880	34680	33500	32350	31220	30110	29020	27950	26900	25870	24860	23860	22880	21920	20980
230	50180	47990	46000	44160	42460	40890	39420	38070	36800	35610	34500	33430	32400	31390	30400	29430	28480	27550	26640	25740	24860	23990
1	226.09	216.67	208.00	200.00	192.00	185.71	179.31	173.33	167.73	162.50	157.58	152.95	148.57	144.44	140.53	136.85	133.33	130.00	126.83	123.81	120.88	118.00
65	14890	14080	13520	13000	12520	12070	11650	11260	10890	10550	10240	9942	9657	9389	9136	8895	8667	8450	8244	8048	7852	7660
80	18080	17330	16640	16000	15410	14850	14340	13860	13400	12960	12540	12140	11760	11400	11050	10720	10400	10070	9750	9430	9110	8800
95	21470	20580	19760	19000	18280	17610	17000	16430	15890	15370	14870	14390	13930	13490	13070	12660	12260	11870	11500	11130	10770	10420
110	24870	23830	22880	22000	21120	20430	19720	19060	18450	17870	17320	16790	16280	15780	15300	14830	14380	13940	13510	13090	12680	12280
125	28260	27080	26000	25000	24070	23210	22410	21660	20950	20260	19590	18940	18310	17700	17100	16520	15960	15420	14890	14370	13860	13360
140	31650	30350	29120	28000	26950	26000	25100	24250	23440	22660	21900	21160	20440	19740	19060	18390	17740	17100	16480	15880	15290	14710
155	35040	33680	32460	31300	30200	29160	28140	27140	26160	25200	24260	23340	22440	21560	20700	19860	19040	18240	17460	16690	15940	15200
170	38430	36930	35680	34500	33400	32340	31300	30280	29280	28300	27340	26400	25480	24580	23700	22840	21990	21160	20340	19540	18760	17990
185	41820	40080	38480	37000	35630	34360	33170	32000	30840	29700	28580	27480	26400	25340	24300	23280	22280	21300	20340	19400	18480	17580
200	45220	43320	41600	40000	38520	37140	35860	34600	33360	32140	30940	29760	28600	27460	26340	25240	24160	23100	22060	21040	20000	18980
215	48610	46580	44720	43000	41400	39930	38530	37160	35800	34460	33140	31840	30560	29300	28060	26840	25640	24460	23300	22160	21040	19980
230	52000	49830	47840	46000	44300	42720	41240	39800	38380	36980	35610	34260	32920	31600	30300	29020	27760	26520	25300	24100	22920	21760
1	235.34	224.00	215.38	207.40	200.00	193.10	186.67	180.66	175.00	169.70	164.71	160.00	155.56	151.36	147.38	143.60	140.00	136.50	133.23	130.00	126.83	123.81
65	15170	14560	14000	13480	12990	12530	12100	11700	11320	10960	10620	10290	9970	9657	9350	9050	8760	8480	8210	7940	7680	7430
80	18770	17920	17250	16590	15960	15360	14790	14260	13750	13260	12790	12340	11900	11480	11080	10690	10310	9940	9580	9230	8890	8560
95	22170	21280	20490	19700	19000	18310	17730	17180	16650	16140	15640	15160	14700	14260	13830	13410	13000	12600	12210	11820	11440	11070
110	25670	24640	23830	23000	22210	21430	20690	20000	19360	18760	18180	17630	17100	16590	16100	15620	15160	14720	14290	13870	13460	13060
125	29170	28000	27020	26200	25410	24640	23900	23200	22520	21860	21220	20600	20000	19410	18840	18280	17740	17210	16690	16180	15680	15190
140	32670	31360	30350	29530	28720	27930	27160	26420	25700	25000	24320	23660	23020	22400	21800	21220	20660	20120	19590	19070	18560	18060
155	36170	34720	33680	32850	32040	31260	30500	29760	29040	28340	27660	27000	26360	25740	25140	24560	23990	23440	22900	22380	21860	21360
170	39670	38080	36930	35950	35000	34080	33180	32300	31440	30600	29780	28980	28190	27420	26660	25920	25200	24500	23820	23160	22520	21890
185	43170	41400	39840	38570	37300	36060	34860	33680	32520	31380	30260	29160	28080	27020	25980	24960	23960	22980	22020	21080	20160	19260
200	46670	44800	43070	41480	40000	38620	37260	35920	34600	33300	32020	30760	29520	28300	27100	25920	24760	23620	22500	21400	20320	19260
215	50170	48160	46300	44580	42900	41240	39600	38000	36420	34860	33320	31800	30300	28820	27360	25920	24500	23100	21720	20360	19020	17700
230	53670	51520	49530	47700	45900	44110	42330	40560	38800	37060	35340	33640	31960	30300	28660	27040	25440	23860	22300	20760	19240	17740

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS		DIAMETER OF DRIVERS																	
DIA.	STROKE	EFF. PRESS.																	
		50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"
20" x 30"		240.00	230.78	222.23	214.30	206.90	200.00	193.56	187.50	181.82	176.49	171.43	166.67	162.17	157.91	153.85	150.00	146.34	142.86
1		15600	15000	14410	13820	13240	12700	12180	11680	11200	10740	10300	9870	9460	9060	8670	8290	7920	7560
65		19200	18460	17770	17140	16550	16000	15480	15000	14540	14100	13680	13270	12880	12500	12130	11780	11440	11100
80		22800	21920	21110	20360	19650	19000	18380	17810	17270	16760	16280	15830	15400	15000	14610	14250	13900	13570
95		26400	25380	24440	23570	22760	22000	21280	20620	20000	19410	18860	18330	17840	17370	16920	16500	16100	15710
110		30000	28850	27780	26790	25860	25000	24190	23430	22720	22060	21430	20830	20270	19740	19230	18750	18290	17850
125		33600	32310	31110	30000	28960	28000	27100	26250	25450	24700	24000	23330	22700	22110	21540	21000	20480	20000
140		37200	35770	34450	33210	32070	31000	30000	29060	28180	27350	26570	25830	25130	24480	23850	23250	22680	22140
155		40800	39320	37780	36430	35170	34000	32900	31870	30910	30000	29140	28320	27540	26800	26100	25420	24780	24180
170		44400	42890	41410	39940	38620	37400	36280	35210	34260	33340	32460	31620	30810	30040	29300	28600	27940	27320
185		48000	46430	44890	43400	41960	40600	39300	38040	36820	35640	34490	33360	32260	31180	30120	29080	28060	27090
200		51600	49910	48280	46700	45180	43760	42360	40980	39640	38340	37060	35800	34560	33340	32140	30960	29740	28580
215		55200	53480	51760	50100	48480	46900	45360	43840	42340	40860	39400	37960	36540	35140	33760	32400	31060	29740
230		58800	56980	55160	53400	51640	50000	48360	46800	45240	43680	42140	40600	39060	37540	36020	34500	32980	31460
20" x 32"		246.16	237.04	228.58	220.60	213.33	206.45	200.00	193.34	187.24	182.87	177.78	172.99	168.42	164.10	160.00	156.10	152.38	.....
1		16000	15410	14850	14340	13860	13420	13000	12600	12230	11880	11550	11240	10950	10680	10430	10190	9960	.....
65		19600	18960	18380	17850	17360	16910	16480	16060	15660	15280	14920	14580	14260	13940	13630	13330	13040	12760
80		23280	22520	21770	21060	20360	19680	19020	18380	17760	17160	16580	16020	15480	14960	14450	13950	13460	12980
95		26960	26070	25140	24270	23460	22710	22000	21320	20670	20040	19430	18840	18270	17720	17190	16680	16180	15700
110		30770	29630	28570	27580	26660	25800	25000	24240	23530	22860	22220	21620	21050	20510	20000	19510	19050	18600
125		34460	33180	32000	30890	29890	28900	28000	27130	26350	25600	24890	24220	23580	22970	22400	21850	21330	20800
140		38150	36740	35430	34210	33060	32000	31000	30060	29180	28340	27530	26810	26100	25430	24800	24200	23610	23030
155		41840	40300	38850	37510	36260	35090	34000	32970	32000	31080	30220	29400	28630	27890	27200	26540	25900	25280
170		45540	43850	42280	40830	39460	38190	37000	35880	34820	33830	32900	32000	31160	30360	29600	28880	28190	27520
185		49230	47410	45710	44140	42660	41290	40000	38790	37650	36570	35550	34600	33680	32820	32000	31220	30470	29740
200		52920	50960	49140	47440	45860	44380	43000	41690	40470	39310	38220	37190	36210	35280	34400	33560	32760	32000
215		56620	54520	52570	50760	49060	47480	46000	44610	43300	42060	40890	39780	38740	37760	36830	35940	35090	34270
230		60320	58120	56170	54360	52580	50840	49200	47560	45920	44380	42840	41300	40000	38660	37320	36000	34680	33360
20" x 34"		251.88	242.87	234.49	226.66	219.36	212.51	206.07	200.00	194.29	188.90	183.79	178.96	174.37	170.00	165.85	161.90	.....	.....
1		16570	15780	15040	14350	13700	13080	12500	11960	11460	10990	10540	10110	9700	9310	8940	8590	8260	7950
65		20130	19340	18600	17910	17260	16640	16060	15510	15000	14500	14020	13560	13120	12700	12300	11910	11540	11180
80		23690	22870	22110	21390	20710	20060	19440	18850	18290	17760	17260	16780	16320	15880	15460	15060	14680	14310
95		27310	26470	25710	24990	24310	23660	23040	22450	21890	21360	20850	20360	19890	19440	19000	18570	18160	17760
110		31480	30630	29870	29150	28470	27820	27200	26600	26030	25490	24980	24490	24020	23570	23140	22720	22310	21910
125		35260	34400	33630	32890	32190	31520	30880	30260	29660	29080	28530	28000	27490	27000	26520	26060	25620	25200
140		39040	37640	36340	35040	33840	32660	31500	30360	29240	28140	27060	26000	24960	23940	22940	21960	20980	20020
155		42820	41280	39880	38530	37200	35900	34630	33390	32180	31000	29840	28600	27420	26260	25120	24000	22900	21820
170		46600	44930	43380	41890	40430	39000	37600	36230	34890	33580	32300	31040	29790	28520	27260	26020	24800	23600
185		50370	48570	46900	45330	43790	42280	40800	39340	37910	36500	35110	33740	32400	31080	29790	28520	27260	26020
200		54150	52210	50410	48790	47160	45580	44000	42460	40960	39480	38020	36580	35160	33760	32380	31020	29680	28360
215		57930	55860	53890	52130	50450	48880	47300	45760	44260	42780	41320	39880	38460	37060	35680	34320	32980	31660
230		61710	59540	57570	55700	53820	52040	50360	48680	47000	45320	43640	41960	40280	38600	36920	35240	33560	31880

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA. STROKE	DIAMETER OF DRIVERS																			
			48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"	
21" x 26"			1	238.87	229.32	220.50	212.33	204.75	197.69	191.10	184.92	179.16	173.72	168.62	163.80	159.25	154.94	150.87	147.00	143.32	139.82	136.50
	65	15520	14900	14330	13800	13310	12850	12420	12020	11640	11290	10960	10650	10350	10070	9807	9555	9317	9090	8872	8650	
	80	19110	18340	17640	16980	16380	15810	15280	14790	14330	13890	13460	13040	12640	12260	11900	11560	11240	10930	10620	10320	
	95	22630	21780	20950	20170	19450	18780	18150	17560	17020	16500	16020	15560	15130	14720	14320	13930	13560	13200	12860	12560	
	110	26270	25220	24250	23300	22500	21740	21020	20340	19710	19110	18530	18020	17520	17040	16590	16170	15760	15360	15010	14660	
	125	29860	28670	27560	26540	25590	24710	23880	23100	22380	21720	21080	20470	19890	19370	18860	18370	17920	17480	17060	16660	
	140	33440	32110	30870	29730	28660	27670	26740	25860	25000	24220	23480	22780	22120	21500	20880	20270	19680	19110	18580	18070	
	155	37020	35530	34180	32910	31740	30640	29620	28660	27770	26930	26140	25390	24680	24000	23320	22650	22010	21370	20760	20170	
	170	40600	38880	37380	36010	34800	33660	32580	31560	30610	29720	28870	28060	27280	26540	25830	25140	24460	23790	23150	22530	
	185	44190	42420	40790	39320	37980	36750	35530	34320	33140	32000	30890	29820	28790	27790	26820	25880	24960	24050	23150	22260	
	200	47770	45880	44100	42460	40930	39500	38220	36980	35780	34620	33500	32420	31370	30350	29360	28400	27460	26540	25630	24730	
	215	51350	49300	47410	45660	44020	42500	41080	39760	38500	37280	36200	35160	34160	33190	32240	31310	30400	29500	28610	27730	
	230	54930	52740	50720	48840	47090	45470	43950	42530	41200	39960	38780	37650	36560	35500	34470	33470	32500	31550	30620	29700	
21" x 28"			1	246.96	237.47	228.67	220.50	212.90	205.80	199.17	192.94	187.08	181.60	176.40	171.50	166.87	162.47	158.30	154.35	150.58	147.00	143.50
	65	16050	15430	14860	14330	13810	13370	12940	12540	12160	11800	11450	11150	10810	10530	10290	10030	9780	9555	9317	9090	8872
	80	19750	18990	18290	17640	17030	16460	15930	15430	14960	14530	14110	13720	13350	13000	12660	12350	12050	11760	11480	11200	10920
	95	23460	22560	21720	20950	20220	19520	18920	18330	17770	17250	16760	16290	15850	15430	15040	14660	14300	13960	13630	13300	13000
	110	27160	26120	25150	24250	23420	22610	21910	21220	20580	19970	19400	18860	18360	17870	17410	16980	16560	16170	15790	15420	15070
	125	30870	29680	28580	27560	26610	25720	24890	24120	23380	22700	22060	21460	20890	20310	19790	19290	18820	18370	17920	17480	17060
	140	34570	33240	32010	30870	29800	28810	27880	27010	26190	25420	24700	24010	23360	22720	22160	21610	21020	20480	19950	19430	18920
	155	38280	36810	35440	34180	33000	31900	30870	29900	28980	28130	27340	26580	25860	25180	24530	23920	23350	22800	22280	21780	21290
	170	41980	40370	38870	37480	36180	34980	33860	32800	31800	30870	29990	29150	28370	27620	26910	26240	25580	24940	24320	23720	23140
	185	45690	43930	42300	40790	39380	38070	36850	35700	34610	33580	32580	31730	30870	30060	29280	28530	27800	27100	26420	25760	25120
	200	49390	47530	45790	44100	42580	41160	39830	38590	37440	36320	35280	34300	33370	32490	31650	30870	31710	29400	28200	27050	25920
	215	53100	51050	49160	47410	45770	44240	42820	41480	40220	39010	37920	36870	35880	34930	34030	33180	32400	31600	30800	29950	29150
	230	56800	54620	52500	50520	48670	47000	45480	44020	42600	41260	40000	38780	37610	36490	35500	34550	33640	32810	32000	31150	30350
21" x 30"			1	254.44	245.00	236.26	228.10	220.50	213.40	206.72	200.45	194.58	189.00	183.75	178.78	174.08	169.61	165.37	161.34	157.50	153.75	150.00
	65	16540	15920	15350	14820	14300	13790	13310	12850	12400	11960	11540	11150	10780	10430	10090	9760	9440	9130	8830	8540	8260
	80	20250	19600	18900	18250	17640	17070	16530	16020	15530	15060	14610	14170	13750	13350	12970	12600	12240	11890	11550	11220	10900
	95	24170	23270	22440	21670	20950	20270	19640	19040	18480	17950	17450	16980	16530	16110	15710	15320	14960	14620	14290	13970	13660
	110	27990	26850	25800	24820	23900	23040	22170	21340	20560	19820	19100	18400	17720	17070	16460	15880	15330	14800	14290	13790	13300
	125	31800	30620	29530	28510	27560	26670	25810	25000	24240	23520	22840	22190	21560	20960	20390	19840	19310	18790	18280	17780	17290
	140	35620	34300	33070	31930	30870	29870	28920	28020	27160	26340	25560	24820	24100	23400	22720	22070	21440	20830	20230	19640	19060
	155	39440	37970	36620	35350	34180	33070	32040	31070	30160	29280	28430	27610	26820	26060	25330	24630	23950	23290	22650	22020	21400
	170	43250	41650	40160	38770	37480	36280	35140	34070	33080	32130	31230	30380	29490	28650	27840	27050	26280	25510	24740	23980	23230
	185	47070	45320	43700	42200	40790	39480	38240	37080	35900	34800	33700	32600	31500	30400	29300	28200	27100	26050	25020	24000	22990
	200	50890	49000	47250	45620	44100	42680	41340	40090	38910	37720	36520	35390	34260	33120	32000	30880	29750	28650	27580	26530	25490
	215	54700	52670	50700	49040	47410	45890	44440	43000	41630	40250	38910	37590	36300	35000	33720	32450	31200	30000	28820	27670	26540
	230	58500	56350	54340	52460	50720	49080	47500	46000	44580	43240	41900	40600	39330	38100	36900	35720	34550	33400	32260	31150	30050

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA.	STROKE	DIAMETER OF DRIVERS																
				54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"	
21" x 32"				1	261.33	252.00	243.31	235.20	227.61	220.50	213.81	207.54	201.60	196.00	190.70	185.69	180.92	176.40	172.10	168.00
	65				16980	16380	15810	15290	14790	14320	13890	13490	13100	12740	12390	12070	11760	11460	11180	10920
	80				20000	20000	19460	18810	18210	17640	17100	16580	16120	15680	15250	14850	14470	14110	13750	13440
	95				24820	23940	23110	22340	21620	20950	20310	19710	19130	18520	18110	17640	17190	16760	16350	15960
	110				29570	27720	26760	25870	25040	24230	23520	22850	22170	21560	20980	20420	19900	19400	18930	18480
	125				34260	31500	30410	29440	28450	27500	26720	25840	25020	24300	23640	23000	22450	21910	21380	20860
	140				38380	35280	34060	32930	31860	30870	29930	29050	28220	27400	26700	25990	25330	24700	24090	23520
	155				42610	39060	37710	36460	35280	34180	33140	32170	31240	30360	29500	28740	28040	27340	26670	26040
	170				44420	42840	41360	39980	38690	37480	36350	35280	34260	33290	32360	31460	30590	29800	29050	28340
	185				46380	44620	43010	41510	40110	38790	37520	36300	35130	33960	32840	31760	30710	29680	28680	27710
	200				52260	50400	48600	47040	45520	44100	42700	41310	40020	38720	37460	36240	35060	33920	32810	31720
	215				56180	54180	52310	50570	48930	47410	45970	44620	43340	42140	41000	39820	38680	37520	36390	35290
	230				60110	57960	55960	54100	52350	50720	49170	47730	46370	45080	43860	42710	41610	40570	39500	38640
21" x 34"				1	267.75	258.52	249.40	241.84	234.25	227.18	220.50	214.20	208.25	202.62	197.28	192.23	187.42	182.85	178.50	
	65				17400	16800	16240	15720	15220	14760	14330	13920	13530	13170	12820	12490	12180	11880	11600	
	80				21420	20680	19960	19340	18740	18170	17640	17100	16580	16120	15780	15380	14990	14630	14280	
	95				25430	24590	23740	22970	22250	21580	20950	20350	19780	19250	18740	18260	17800	17370	16950	
	110				29450	28440	27490	26600	25770	24990	24250	23560	22910	22290	21700	21140	20620	20110	19620	
	125				33470	32310	31240	30230	29280	28390	27560	26770	26030	25320	24650	24030	23430	22870	22310	
	140				37480	36190	34980	33860	32790	31860	30870	29930	29050	28220	27400	26700	26040	25400	24800	
	155				41500	40070	38720	37480	36310	35210	34180	33200	32280	31400	30540	29700	28900	28140	27390	
	170				45320	43950	42480	41110	39820	38620	37480	36400	35360	34340	33340	32360	31400	30460	29540	
	185				49330	47820	46230	44740	43340	42020	40790	39620	38500	37480	36500	35560	34670	33820	32920	
	200				53350	51700	49980	48370	46830	45430	44100	42840	41650	40520	39460	38440	37480	36570	35700	
	215				57360	55580	53720	51990	50380	48840	47410	46050	44770	43560	42410	41330	40290	39310	38370	
	230				61380	59460	57480	55620	53880	52250	50720	49260	47900	46600	45380	44210	43110	42050	41050	
21" x 36"				1	273.71	264.60	256.05	248.06	240.55	233.48	226.89	220.50	214.53	208.89	203.53	198.45	193.61	189.00		
	65				17790	17200	16640	16120	15630	15170	14740	14330	13940	13580	13230	12900	12580	12280		
	80				21890	21160	20480	19840	19240	18680	18140	17640	17160	16710	16280	15870	15490	15120		
	95				26000	25130	24320	23560	22850	22180	21540	20950	20380	19850	19330	18830	18330	17850		
	110				30110	29100	28160	27290	26460	25660	24870	24120	23400	22700	22020	21360	20720	20100		
	125				34210	33070	32010	31000	30070	29180	28350	27560	26820	26110	25440	24800	24190	23600		
	140				38320	37040	35850	34730	33680	32680	31750	30870	30020	29240	28500	27780	27110	26460		
	155				42430	41010	39800	38650	37580	36590	35670	34800	33960	33150	32370	31610	30880	30190		
	170				46530	44980	43530	42170	40890	39690	38560	37460	36400	35380	34390	33430	32500	31600		
	185				50640	48950	47370	45800	44300	42890	41560	40300	39090	37920	36790	35690	34620	33580		
	200				54740	52920	51210	49610	48110	46690	45360	44100	42890	41720	40590	39490	38420	37380		
	215				58840	56880	55050	53320	51720	50200	48760	47410	46120	44870	43660	42470	41300	40160		
	230				62960	60860	58890	57000	55250	53620	52070	50620	49260	47900	46600	45380	44210	43050		

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	DIA.	STROKE	MEAN EFF. PRESS.	DIAMETER OF DRIVERS																		
				50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"	
22" x 28"				1	271.04	260.60	250.95	242.00	233.64	225.86	218.58	211.75	205.32	199.30	193.60	188.22	183.13	178.31	173.74	169.40	165.27	161.33
65				17610	16940	16310	15730	15190	14680	14210	13760	13340	12950	12580	12230	11900	11590	11300	11010	10740	10480	
80				21680	20850	20070	19350	18690	18070	17480	16940	16420	15910	15400	14900	14400	13900	13400	12900	12400	11900	
95				23730	22750	21840	20990	20200	19450	18740	18060	17400	16760	16130	15500	14880	14260	13640	13020	12400	11780	
110				25810	24670	23600	22600	21660	20780	19940	19130	18340	17560	16780	16000	15220	14440	13660	12880	12100	11320	
125				27900	26570	25300	24090	22940	21840	20780	19750	18740	17740	16740	15740	14740	13740	12740	11740	10740	9740	
140				29880	28270	26770	25320	23920	22570	21260	20000	18780	17580	16380	15180	13980	12780	11580	10380	9180	7980	
155				31740	30480	29130	27680	26230	24780	23330	21880	20430	18980	17530	16080	14630	13180	11730	10280	8830	7380	
170				33480	32000	30480	28960	27360	25760	24160	22560	20960	19360	17760	16160	14560	12960	11360	9760	8160	6560	
185				35010	33400	31680	29960	28160	26360	24560	22760	20960	19160	17360	15560	13760	11960	10160	8360	6560	4760	
200				36420	34620	32720	30720	28620	26520	24320	22120	19920	17720	15520	13320	11120	8920	6720	4520	2320	1000	
215				37720	35720	33620	31420	29120	26820	24420	22020	19620	17220	14820	12420	10020	7620	5220	2820	1000	1000	
230				38940	36740	34440	32040	29540	27040	24440	21840	19240	16640	14040	11440	8840	6240	3640	1000	1000	1000	
22" x 30"				1	279.20	268.80	259.28	250.31	242.00	234.18	226.87	220.00	213.52	207.43	201.66	196.20	191.06	186.16	181.50	177.08	172.86	
65				18150	17470	16850	16270	15730	15220	14740	14300	13880	13480	13110	12750	12420	12100	11790	11510	11230	10950	
80				22330	21510	20740	20020	19360	18730	18150	17600	17080	16580	16130	15680	15280	14890	14520	14160	13830	13500	
95				24320	23500	22680	21960	21240	20520	19800	19200	18620	18060	17520	16980	16480	15980	15480	14980	14480	13980	
110				26310	25490	24670	23950	23230	22510	21790	21170	20570	19980	19400	18820	18260	17700	17140	16580	16020	15460	
125				28300	27480	26660	25940	25220	24500	23780	23160	22560	21960	21380	20800	20220	19640	19060	18480	17900	17320	
140				30290	29470	28650	27930	27210	26490	25770	25150	24530	23910	23300	22680	22060	21440	20820	20200	19580	18960	
155				32280	31460	30640	29920	29200	28480	27760	27140	26520	25900	25280	24660	24040	23420	22800	22180	21560	20940	
170				34270	33450	32630	31910	31190	30470	29750	29130	28510	27890	27270	26650	26030	25410	24790	24170	23550	22930	
185				36260	35440	34620	33900	33180	32460	31740	31120	30500	29880	29260	28640	28020	27400	26780	26160	25540	24920	
200				38250	37430	36610	35890	35170	34450	33730	33110	32490	31870	31250	30630	30010	29390	28770	28150	27530	26910	
215				40240	39420	38600	37880	37160	36440	35720	35100	34480	33860	33240	32620	32000	31380	30760	30140	29520	28900	
230				42230	41410	40590	39870	39150	38430	37710	37090	36470	35850	35230	34610	34000	33380	32760	32140	31520	30900	
22" x 32"				1	286.81	276.37	267.03	258.13	249.79	242.00	234.66	227.78	221.26	215.11	209.29	203.78	198.55	193.60	188.88	184.38	179.98	
65				18640	17970	17350	16780	16260	15780	15320	14880	14460	14040	13620	13210	12810	12420	12030	11640	11260	10880	
80				22940	22120	21300	20650	19980	19360	18770	18220	17690	17170	16660	16160	15660	15160	14660	14160	13660	13160	
95				24930	24110	23290	22640	21970	21350	20760	20190	19640	19100	18560	18020	17480	16940	16400	15860	15320	14780	
110				26920	26100	25280	24630	23960	23340	22750	22180	21620	21060	20500	19940	19380	18820	18260	17700	17140	16580	
125				28910	28090	27270	26620	25950	25330	24740	24170	23600	23020	22440	21860	21280	20700	20120	19540	18960	18380	
140				30900	29980	29160	28510	27840	27220	26630	26040	25450	24860	24260	23660	23060	22460	21860	21260	20660	20060	
155				32890	31970	31150	30500	29830	29210	28620	28020	27420	26820	26220	25620	25020	24420	23820	23220	22620	22020	
170				34880	33960	33140	32490	31820	31190	30590	30000	29400	28800	28200	27600	27000	26400	25800	25200	24600	24000	
185				36870	35950	35130	34480	33810	33180	32580	31980	31380	30780	30180	29580	28980	28380	27780	27180	26580	25980	
200				38860	37940	37120	36470	35800	35170	34560	33960	33360	32760	32160	31560	30960	30360	29760	29160	28560	27960	
215				40850	40000	39180	38530	37860	37230	36620	36020	35420	34820	34220	33620	33020	32420	31820	31220	30620	30020	
230				42840	42000	41180	40530	39860	39230	38620	38020	37420	36820	36220	35620	35020	34420	33820	33220	32620	32020	

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS		MEAN EFF. PRES.	DIAMETER OF DRIVERS															
DIA.	STROKE		56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"	
22" x 34"			293.86	283.71	274.26	265.40	257.12	249.33	242.00	235.08	228.55	222.37	216.52	211.00	205.70	200.70	195.90	
1			19100	18440	17820	17230	16670	16130	15600	15080	14570	14070	13570	13070	12570	12070	11570	
65			22500	21900	21300	20700	20100	19500	18900	18300	17700	17100	16500	15900	15300	14700	14100	
80			24910	24300	23690	23080	22470	21860	21250	20640	20030	19420	18810	18200	17590	16980	16370	
95			27320	26710	26100	25490	24880	24270	23660	23050	22440	21830	21220	20610	20000	19390	18780	
110			29730	29120	28510	27900	27290	26680	26070	25460	24850	24240	23630	23020	22410	21800	21190	
125			32140	31530	30920	30310	29700	29090	28480	27870	27260	26650	26040	25430	24820	24210	23600	
140			34550	33940	33330	32720	32110	31500	30890	30280	29670	29060	28450	27840	27230	26620	26010	
155			36960	36350	35740	35130	34520	33910	33300	32690	32080	31470	30860	30250	29640	29030	28420	
170			39370	38760	38150	37540	36930	36320	35710	35100	34490	33880	33270	32660	32050	31440	30830	
185			41780	41170	40560	39950	39340	38730	38120	37510	36900	36290	35680	35070	34460	33850	33240	
200			44190	43580	42970	42360	41750	41140	40530	39920	39310	38700	38090	37480	36870	36260	35650	
215			46600	45990	45380	44770	44160	43550	42940	42330	41720	41110	40500	39890	39280	38670	38060	
230			49010	48400	47790	47180	46570	45960	45350	44740	44130	43520	42910	42300	41690	41080	40470	
22" x 36"			300.41	290.40	281.04	272.25	264.00	256.24	248.91	242.00	235.45	229.26	223.38	217.80	212.50	207.42		
1			19520	18870	18270	17690	17130	16580	16040	15500	14960	14420	13880	13340	12800	12260	11720	
65			24030	23380	22780	22180	21600	21030	20460	19900	19340	18780	18220	17660	17100	16540	15980	
80			25530	24880	24280	23680	23090	22500	21910	21320	20730	20140	19550	18960	18370	17780	17190	
95			27030	26380	25780	25180	24590	24000	23410	22820	22230	21640	21050	20460	19870	19280	18690	
110			28530	27880	27280	26680	26090	25500	24910	24320	23730	23140	22550	21960	21370	20780	20190	
125			30030	29380	28780	28180	27590	27000	26410	25820	25230	24640	24050	23460	22870	22280	21690	
140			31530	30880	30280	29680	29090	28500	27910	27320	26730	26140	25550	24960	24370	23780	23190	
155			33030	32380	31780	31180	30590	30000	29410	28820	28230	27640	27050	26460	25870	25280	24690	
170			34530	33880	33280	32680	32090	31500	30910	30320	29730	29140	28550	27960	27370	26780	26190	
185			36030	35380	34780	34180	33590	33000	32410	31820	31230	30640	30050	29460	28870	28280	27690	
200			37530	36880	36280	35680	35090	34500	33910	33320	32730	32140	31550	30960	30370	29780	29190	
215			39030	38380	37780	37180	36590	36000	35410	34820	34230	33640	33050	32460	31870	31280	30690	
230			40530	39880	39280	38680	38090	37500	36910	36320	35730	35140	34550	33960	33370	32780	32190	
22" x 38"			306.53	296.52	287.37	278.66	270.47	262.74	255.44	248.52	242.00	235.78	229.90	224.29	218.95			
1			19920	19270	18680	18110	17580	17080	16590	16110	15630	15150	14670	14190	13710	13230	12750	
65			24430	23780	23190	22600	22020	21450	20880	20320	19750	19180	18610	18040	17470	16900	16330	
80			25930	25280	24690	24100	23510	22920	22330	21740	21150	20560	19970	19380	18790	18200	17610	
95			27430	26780	26190	25600	25010	24420	23830	23240	22650	22060	21470	20880	20290	19700	19110	
110			28930	28280	27690	27100	26510	25920	25330	24740	24150	23560	22970	22380	21790	21200	20610	
125			30430	29780	29190	28600	28010	27420	26830	26240	25650	25060	24470	23880	23290	22700	22110	
140			31930	31280	30690	30100	29510	28920	28330	27740	27150	26560	25970	25380	24790	24200	23610	
155			33430	32780	32190	31600	31010	30420	29830	29240	28650	28060	27470	26880	26290	25700	25110	
170			34930	34280	33690	33100	32510	31920	31330	30740	30150	29560	28970	28380	27790	27200	26610	
185			36430	35780	35190	34600	34010	33420	32830	32240	31650	31060	30470	29880	29290	28700	28110	
200			37930	37280	36690	36100	35510	34920	34330	33740	33150	32560	31970	31380	30790	30200	29610	
215			39430	38780	38190	37600	37010	36420	35830	35240	34650	34060	33470	32880	32290	31700	31110	
230			40930	40280	39690	39100	38510	37920	37330	36740	36150	35560	34970	34380	33790	33200	32610	

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	DIA.	STROKE	MEAN EFF. PRES.	DIAMETER OF DRIVERS																	
				52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"	
23" x 28"				1	284.88	274.30	264.50	255.40	246.86	238.90	231.44	224.42	217.81	211.60	205.72	200.18	194.91	189.91	185.15	180.62	176.33
65				18510	17830	17190	16600	16040	15530	15040	14580	14160	13750	13370	13010	12670	12340	12030	11740	11460	
80				22790	21940	21100	20430	19750	19110	18510	17950	17420	16930	16450	16010	15590	15190	14810	14450	14100	
95				27060	26060	25120	24260	23520	22880	21980	21320	20690	20100	19540	19010	18510	18040	17590	17160	16750	
110				31330	30170	29100	28090	27150	26280	25460	24680	23920	23270	22650	22060	21410	20800	20210	19640	19100	
125				35610	34290	33060	31920	30860	29860	28930	28050	27230	26530	25870	25240	24630	24040	23470	22920	22400	
140				39880	38400	37030	35760	34560	33440	32400	31420	30490	29620	28800	28020	27260	26530	25820	25130	24460	
155				44150	42520	41000	39590	38290	37090	35870	34780	33760	32800	31890	31020	30160	29330	28520	27730	26960	
170				48430	46630	44960	43420	41960	40610	39340	38150	37030	35970	34970	34030	33130	32250	31470	30700	29950	
185				52700	50750	48930	47250	45670	44190	42820	41520	40300	39140	38060	37030	36030	35060	34120	33200	32300	
200				56970	54860	52900	51080	49370	47780	46280	44850	43480	42160	40890	39670	38500	37360	36250	35160	34100	
215				61250	58980	56870	54910	53070	51360	49760	48250	46830	45460	44130	42850	41610	40400	39220	38060	36930	
230				65520	63090	60840	58740	56770	54940	53230	51620	50100	48670	47320	46040	44800	43590	42400	41230	40090	
23" x 30"				1	293.90	283.40	273.61	264.50	255.37	247.90	240.45	233.38	226.71	220.41	214.46	208.81	203.46	198.37	193.52	188.92	
65				19100	18420	17780	17190	16630	16110	15630	15170	14730	14310	13910	13520	13150	12790	12450	12130	11820	
80				23510	22670	21890	21160	20470	19830	19230	18670	18130	17630	17150	16700	16270	15860	15470	15100	14750	
95				27920	26920	25900	25120	24310	23550	22840	22170	21530	20940	20370	19830	19320	18840	18380	17950	17530	
110				32330	31170	30100	29100	28150	27270	26450	25670	24940	24250	23600	22970	22380	21820	21290	20780	20290	
125				36740	35420	34290	33260	32300	31390	30530	29710	28940	28210	27530	26890	26290	25720	25180	24670	24180	
140				41150	39670	38300	37030	35830	34710	33650	32650	31700	30800	30000	29240	28520	27840	27190	26570	26030	
155				45560	43830	42410	41090	39870	38750	37690	36700	35740	34830	33960	33130	32340	31590	30870	29980	29280	
170				49960	48180	46510	44960	43510	42130	40870	39670	38540	37470	36450	35480	34550	33650	32780	31940	31130	
185				54370	52480	50820	49290	47850	46500	45230	44040	42900	41810	40770	39730	38730	37760	36820	35910	35020	
200				58780	56800	54920	53200	51630	50110	48630	47200	45840	44530	43270	42060	40900	39770	38670	37600	36550	
215				63190	61030	58920	56870	55000	53310	51730	50170	48740	47390	46110	44890	43740	42550	41410	40290	39200	
230				67600	65180	62830	60640	58570	56630	54800	53070	51440	50000	48640	47360	46140	44970	43840	42740	41670	
23" x 32"				1	302.20	291.85	282.13	273.01	264.50	256.48	248.92	241.85	235.11	228.75	222.72	217.01	211.60	206.46	201.52	196.77	
65				19640	18970	18340	17740	17190	16670	16180	15720	15280	14860	14460	14070	13700	13340	13000	12670	12360	
80				24180	23340	22570	21840	21160	20510	19910	19340	18790	18260	17750	17260	16780	16320	15870	15440	15020	
95				28710	27720	26800	25930	25120	24360	23640	22970	22330	21730	21160	20610	20080	19560	19060	18570	18100	
110				33250	32100	31030	30030	29100	28210	27380	26600	25870	25190	24550	23940	23350	22770	22210	21670	21150	
125				37780	36480	35270	34130	33060	32060	31110	30230	29390	28590	27840	27130	26450	25800	25190	24600	24030	
140				42320	40860	39500	38220	37030	35890	34800	33760	32760	31800	30880	29990	29130	28300	27500	26730	26000	
155				46850	45230	43730	42320	41000	39750	38580	37480	36440	35450	34520	33640	32790	31970	31180	30420	29690	
170				51390	49610	47960	46410	44960	43600	42320	41110	39970	38890	37860	36870	35920	35000	34100	33230	32390	
185				55920	53990	52200	50510	48930	47450	46050	44740	43500	42310	41160	40050	38970	37930	36920	35940	35000	
200				60460	58360	56420	54600	52900	51290	49780	48360	47020	45740	44510	43310	42140	41000	39890	38810	37760	
215				64990	62740	60660	58700	56870	55140	53520	51990	50550	49170	47850	46590	45390	44240	43120	42030	40970	
230				69520	67120	64890	62790	60840	58900	57060	55320	53670	52110	50610	49170	47800	46490	45240	44040	42880	

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA.	STROKE	DIAMETER OF DRIVERS															
				58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"		
23" x 34"				310.10	299.76	290.09	281.02	272.51	264.50	256.94	249.80	243.01	236.64	230.59	224.82	219.31	214.12		
1				20150	19480	18850	18269	17710	17190	16700	16230	15790	15380	14980	14610	14250	13920		
65				24800	23980	23200	22480	21800	21160	20550	19980	19440	18930	18440	17980	17540	17130		
80				29450	28470	27750	26980	26280	25610	24980	24370	23780	23200	22640	22100	21580	21040		
95				34110	32970	31910	30910	29980	29100	28260	27470	26730	26020	25330	24670	24030	23410		
110				38760	37470	36260	35130	34060	33060	32120	31220	30360	29580	28820	28100	27410	26770		
125				43410	41960	40610	39340	38130	36960	35820	34710	33630	32580	31560	30560	29590	28640		
140				48070	46460	44960	43560	42240	41000	39820	38710	37630	36580	35560	34570	33600	32650		
155				52720	50960	49310	47770	46330	44960	43660	42440	41300	40200	39120	38070	37040	36030		
170				57370	55450	53660	51990	50420	48930	47530	46210	44960	43780	42660	41560	40480	39420		
185				62020	59950	58020	56200	54500	52900	51380	49950	48600	47330	46110	44900	43800	42820		
200				66670	64440	62370	60420	58590	56870	55240	53700	52240	50860	49570	48340	47150	46040		
215				71320	68840	66720	64640	62670	60840	59100	57450	55890	54430	53030	51710	50440	49250		
23" x 36"				317.40	307.18	297.56	288.54	280.08	272.06	264.50	257.35	250.50	244.16	238.05	232.22	226.71			
1				20630	19960	19340	18750	18200	17680	17190	16720	16290	15870	15470	15090	14730			
65				25300	24570	23800	23080	22400	21760	21160	20580	20040	19530	19040	18580	18130			
80				30150	29180	28260	27410	26600	25840	25120	24450	23800	23190	22610	22060	21530			
95				34910	33790	32730	31710	30810	29920	29100	28310	27560	26850	26180	25500	24940			
110				39670	38400	37200	36170	35210	34310	33460	32670	31920	31200	30520	29890	29340			
125				44430	43000	41690	40400	39210	38090	37030	36030	35080	34180	33320	32510	31740			
140				49200	47610	46120	44720	43410	42170	41000	39890	38840	37840	36890	36000	35140			
155				53960	52220	50680	49260	47910	46630	45450	44340	43300	42300	41340	40420	39540			
170				58720	56850	55150	53580	52110	50710	49390	48140	46960	45840	44760	43710	42690			
185				63480	61450	59510	57710	56010	54410	52900	51470	50120	48830	47600	46440	45340			
200				68240	66040	63970	62040	60240	58490	56870	55380	53930	52530	51180	49950	48740			
215				73000	70650	68440	66370	64420	62570	60840	59190	57640	56160	54740	53410	52140			
230																			
23" x 38"				324.22	314.09	304.60	295.62	287.17	279.20	271.66	264.50	257.71	251.27	245.16	239.31				
1				21070	20410	19790	19210	18660	18150	17650	17190	16750	16330	15930	15550				
65				25930	25120	24360	23650	22970	22330	21730	21160	20610	20100	19610	19140				
80				30800	29830	28930	28080	27260	26480	25740	25030	24350	23700	23080	22500				
95				35660	34530	33520	32520	31560	30640	29760	28920	28100	27300	26540	25820				
110				40530	39260	38070	36950	35880	34860	33890	32960	32070	31210	30390	29610				
125				45390	43970	42640	41390	40200	39060	37970	36930	35940	34990	34080	33210				
140				50250	48680	47210	45820	44510	43270	42100	41000	39950	38950	38000	37090				
155				55120	53390	51780	50250	48810	47460	46190	44990	43840	42730	41660	40630				
170				60080	58100	56250	54530	52900	51350	50000	48690	47480	46380	45300	44270				
185				65040	62820	60820	58920	57120	55410	53780	52240	50790	49450	48200	47000				
200				70000	67530	65480	63560	61740	60030	58400	56870	55410	54020	52700	51450				
215				74970	72240	70060	68060	66150	64320	62570	60940	59400	57940	56560	55240				
230																			

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIA.	STROKE	DIAMETER OF DRIVERS															
				54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"
				24" x 30"															
1				320.00	308.57	297.92	288.00	278.70	270.00	261.82	254.12	246.80	240.00	233.50	227.38	221.52	216.00	210.73	205.71
65				20800	20050	19330	18720	18110	17550	17020	16520	16040	15600	15170	14780	14400	14040	13700	13370
80				25000	24680	23833	23040	22280	21600	20940	20320	19750	19200	18680	18180	17720	17280	16860	16450
95				30400	29310	28300	27360	26470	25650	24870	24140	23450	22800	22180	21600	21040	20520	20020	19540
110				35200	33940	32770	31680	30660	29700	28800	27950	27130	26400	25680	25010	24370	23760	23180	22630
125				40000	38570	37240	36000	34840	33730	32730	31760	30850	30000	29190	28420	27690	27000	26340	25710
140				44800	43260	41710	40320	38920	37580	36380	35260	34200	33260	32360	31500	30680	29900	29150	28430
155				49600	47850	46180	44640	43200	41830	40580	39380	38250	37200	36240	35300	34400	33540	32700	31880
170				54400	52480	50650	48960	47380	45900	44510	43200	41960	40800	39680	38650	37660	36720	35820	34970
185				59200	57080	55120	53280	51560	49950	48440	47010	45670	44400	43200	42060	40980	39960	38990	38060
200				64000	61710	59580	57600	55740	54000	52360	50820	49370	48000	46700	45470	44300	43200	42130	41140
215				68800	66340	64050	61920	59920	58050	56280	54690	53170	51690	50250	48880	47630	46440	45310	44230
230				73600	70970	68530	66240	64100	62100	60220	58450	56770	55200	53700	52290	50950	49680	48470	47310
24" x 32"				329.14	317.80	307.20	297.29	288.00	279.22	271.08	263.31	256.00	249.08	242.54	236.30	230.40	224.79	219.42	
1				21390	20650	19960	19320	18720	18150	17620	17110	16610	16100	15600	15100	14600	14100	13610	13130
65				26320	25420	24570	23780	23040	22340	21680	21060	20480	19920	19380	18860	18360	17880	17400	16930
80				31260	30190	29180	28240	27360	26530	25750	25010	24300	23600	22940	22300	21680	21080	20500	19940
95				36210	34960	33730	32700	31680	30720	29810	28960	28160	27400	26680	25980	25300	24640	24000	23380
110				41140	39720	38400	37100	35800	34610	33480	32400	31360	30360	29380	28420	27480	26560	25660	24780
125				46080	44490	43010	41620	40320	39040	37860	36780	35740	34740	33760	32800	31860	30940	29940	28960
140				51020	49260	47610	46080	44640	43200	41860	40600	39420	38300	37220	36160	35120	34100	33100	32120
155				55950	54020	52220	50560	48960	47440	46000	44640	43360	42140	40960	39820	38700	37600	36520	35460
170				60890	58790	56830	55000	53280	51660	50130	48700	47360	46080	44840	43640	42460	41300	40160	39040
185				65830	63560	61440	59460	57600	55850	54210	52660	51200	49800	48480	47200	45960	44800	43680	42580
200				70770	68290	66040	63920	61920	60040	58280	56610	55040	53500	52000	50540	49120	47720	46340	44980
215				75710	73100	70690	68380	66240	64250	62350	60500	58800	57200	55600	54040	52520	51020	49540	48080
230				80650	77600	74700	71900	69200	66600	64100	61700	59400	57200	55000	52800	50600	48400	46200	44000
24" x 34"				337.67	326.40	315.85	306.40	296.73	288.00	279.77	272.00	264.63	257.70	251.06	244.80	238.81	233.14		
1				21940	21210	20530	19890	19280	18700	18180	17690	17230	16790	16360	15940	15520	15100	14680	14260
65				27010	26110	25260	24480	23730	23040	22380	21760	21170	20610	20080	19560	19040	18520	18000	17500
80				32070	31000	30000	29070	28180	27360	26570	25840	25140	24480	23850	23250	22650	22050	21450	20850
95				37140	35900	34730	33630	32610	31680	30770	29920	29100	28300	27520	26760	26020	25280	24540	23800
110				42210	40800	39480	38250	37090	36000	34970	34000	33080	32210	31360	30520	29690	28860	28030	27200
125				47270	45700	44260	42840	41540	40260	39000	37860	36740	35640	34560	33500	32440	31380	30320	29260
140				52340	50590	48960	47430	45990	44640	43360	42140	40960	39800	38640	37500	36380	35260	34140	33020
155				57400	55480	53630	51920	50260	48640	47060	45520	44020	42540	41080	39640	38200	36780	35360	33940
170				62470	60390	58430	56600	54900	53240	51620	50040	48500	46980	45480	44000	42540	41100	40600	39600
185				67530	65280	63170	61200	59360	57640	55960	54320	52700	51100	49520	47960	46440	44940	43460	41980
200				72590	70180	67910	65790	63800	61920	60150	58480	56840	55220	53620	52040	50480	48940	47420	45900
215				77650	75000	72500	70000	67600	65300	63000	60800	58700	56600	54500	52400	50300	48200	46100	44000
230				82710	79700	76900	74200	71600	69100	66600	64200	61800	59400	57000	54600	52200	49800	47400	45000

TABLE I.—(Continued).

TRACTION POWER OF LOCOMOTIVES, IN POUNDS, FOR DIFFERENT MEAN EFFECTIVE PRESSURES.

CYLINDERS	MEAN EFF. PRES.	DIAMETER OF DRIVERS													
		DIA. STROKE													
		60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"	
24" x 36"															
1	1	345.60	334.42	324.00	314.18	304.94	296.23	288.00	280.19	272.83	265.80	259.20	252.87	246.86	
65	65	22480	21740	21060	20420	19820	19250	18720	18210	17730	17270	16830	16430	16040	
80	80	27640	26750	25920	25130	24380	23670	23000	22340	21710	21110	20520	20000	19470	
95	95	32830	31770	30780	29840	28950	28110	27300	26510	25740	25000	24280	23580	22900	
110	110	38020	36780	35640	34500	33360	32280	31260	30290	29340	28410	27500	26600	25710	
125	125	43200	41800	40500	39270	38030	36800	35590	34400	33220	32040	30870	29710	28560	
140	140	48380	46820	45360	43980	42660	41400	40200	39040	37910	36810	35730	34660	33610	
155	155	53570	51840	50120	48400	46720	45080	43480	41910	40360	38830	37320	35830	34360	
170	170	58760	56880	55000	53110	51260	49440	47660	45900	44160	42440	40740	39060	37400	
185	185	63940	61870	59840	57800	55800	53840	51920	50020	48140	46280	44440	42620	40820	
200	200	69120	66880	64680	62500	60360	58240	56160	54100	52060	50040	48040	46060	44100	
215	215	74300	71900	69460	67000	64560	62040	59560	57040	54560	52060	49560	47060	44560	
230	230	79480	76920	74320	71760	69160	66560	63960	61360	58760	56160	53560	50960	48360	
24" x 38"															
1	1	353.05	342.00	331.64	321.90	312.68	304.00	295.78	288.00	280.59	273.60	267.00	260.56	254.36	
65	65	22940	22270	21550	20820	20090	19360	18620	17890	17160	16430	15700	14970	14250	
80	80	28210	27380	26530	25670	24800	23930	23060	22190	21310	20440	19570	18700	17830	
95	95	33530	32480	31380	30280	29170	28060	26950	25840	24730	23620	22510	21400	20290	
110	110	38830	37620	36480	35310	34130	32950	31760	30570	29380	28190	27000	25810	24620	
125	125	44130	42750	41450	40140	38830	37520	36210	34900	33590	32280	30970	29660	28350	
140	140	49420	47880	46380	44860	43340	41820	40300	38780	37260	35740	34220	32700	31180	
155	155	54720	53010	51300	49590	47880	46170	44460	42750	41040	39330	37620	35910	34200	
170	170	60010	58140	56280	54420	52560	50700	48840	46980	45120	43260	41400	39540	37680	
185	185	65310	63270	61260	59240	57220	55200	53180	51160	49140	47120	45100	43080	41060	
200	200	70610	68400	66230	64080	61920	59760	57600	55440	53280	51120	48960	46800	44640	
215	215	75910	73530	71190	68800	66400	63960	61520	59080	56640	54200	51760	49320	46880	
230	230	81200	78660	76120	73580	71040	68500	65960	63420	60880	58340	55800	53260	50720	
24" x 40"															
1	1	360.00	349.00	338.88	329.14	320.00	311.33	303.17	295.39	288.00	280.97	274.28	267.69	261.10	
65	65	25430	24690	23920	23130	22340	21550	20760	19970	19180	18390	17600	16810	16020	
80	80	30810	29920	29000	28060	27120	26180	25240	24300	23360	22420	21480	20540	19600	
95	95	36200	35160	34180	33180	32160	31140	30120	29100	28080	27060	26040	25020	24000	
110	110	41590	40400	39220	38020	36820	35620	34420	33220	32020	30820	29620	28420	27220	
125	125	47000	45640	44340	43040	41740	40440	39140	37840	36540	35240	33940	32640	31340	
140	140	52410	50900	49400	47900	46400	44900	43400	41900	40400	38900	37400	35900	34400	
155	155	57820	56140	54460	52780	51100	49420	47740	46060	44380	42700	41020	39340	37660	
170	170	63230	61400	59580	57760	55940	54120	52300	50480	48660	46840	45020	43200	41380	
185	185	68640	66680	64720	62760	60800	58840	56880	54920	52960	51000	49040	47080	45120	
200	200	74050	71960	69880	67800	65720	63640	61560	59480	57400	55320	53240	51160	49080	
215	215	79460	77260	75080	72900	70720	68540	66360	64180	62000	59820	57640	55460	53280	
230	230	84870	82580	80300	77920	75540	73160	70780	68400	66020	63640	61260	58880	56500	

TABLE II.
NUMBER OF FEET THE PISTON TRAVELS PER ENGINE MILE.

[illegible]

TABLE III.

MEAN AVAILABLE PRESSURES AT DIFFERENT PISTON SPEEDS AND BOILER PRESSURES.

Boiler Pressure	Piston Speed in Feet per Minute																							
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1100	1200	1300	1400	1500
150	135	134	132	129	124	119	113	105	99	93	87	81	77	71	67	63	60	57	55	50	46	43	40	37
165	149	148	146	141	136	131	124	116	108	102	96	89	84	79	73	69	66	63	60	55	51	47	44	40
180	162	161	159	154	149	142	135	126	118	112	104	97	92	86	80	75	72	68	65	60	56	51	47	44
195	176	175	172	167	161	154	146	137	128	121	113	105	99	93	87	82	78	74	71	65	60	56	51	48
210	189	188	185	180	173	166	158	147	138	130	122	113	107	100	94	88	84	80	76	70	65	60	55	51
225	203	202	198	193	186	178	169	158	147	139	131	122	115	107	100	94	90	85	82	75	70	64	59	55
240	215	215	211	205	198	190	180	168	158	148	139	130	122	114	107	101	96	91	87	80	74	68	63	59
255	230	229	225	218	210	202	192	179	167	158	148	138	130	121	114	107	102	97	93	85	79	73	67	62

TABLE IV.
NUMBER OF REVOLUTIONS OF DRIVING WHEELS PER MILE.

NUMBER OF REVOLUTIONS OF DRIVING WHEELS PER MILE.

DIAMETER OF DRIVERS		28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"	50"	52"	54"	56"
Revolutions per Mile		720.3	672.2	630.3	593.2	560.2	530.7	504.2	480.2	458.4	438.4	420.2	403.4	387.8	373.5	360.1
DIAMETER OF DRIVERS		58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"	
Revolutions per Mile		347.7	336.1	325.3	315.1	305.5	296.6	288.1	280.1	272.5	265.3	258.5	252.4	245.9	240.1	.....

TABLE V.
TRAIN RESISTANCE IN POUNDS PER TON.

PER CENT.	0	.09	.19	.28	.38	.47	GRADE						1.71	1.89	2.08	2.27	2.46
							.57	.76	.95	1.14	1.33	1.52					
FEET PER MILE	0	5	10	15	20	25	30	40	50	60	70	80	90	100	110	120	130
SPEED IN MILES PER HOUR.	0	1.89	3.79	5.68	7.58	9.47	11.36	15.15	18.94	22.73	26.52	30.30	34.09	37.88	41.67	45.46	49.24
	5	5.1	7.0	8.9	10.8	12.7	14.6	18.4	22.2	26.0	29.8	33.5	37.3	41.1	44.9	48.7	52.5
	10	4.50	6.4	8.3	10.2	12.1	14.0	17.9	21.5	25.2	29.0	32.8	36.6	40.4	44.2	48.0	51.8
	15	5.75	7.6	9.5	11.4	13.3	15.2	17.1	20.9	24.7	28.5	32.3	36.1	39.9	43.7	47.5	51.3
	20	7.00	8.9	10.8	12.7	14.6	16.5	18.4	22.2	26.0	29.8	33.6	37.3	41.1	44.9	48.7	52.5
	25	8.25	10.1	12.0	13.9	15.8	17.7	19.6	23.4	27.2	31.0	34.8	38.6	42.4	46.2	50.0	53.8
	30	9.50	11.4	13.3	15.2	17.1	19.0	20.9	24.7	28.5	32.3	36.1	39.9	43.7	47.5	51.3	55.1
	35	10.75	12.6	14.5	16.4	18.3	20.2	22.1	25.9	29.7	33.5	37.3	41.1	44.9	48.6	52.4	56.2
	40	12.00	13.9	15.8	17.7	19.6	21.5	23.4	27.2	31.0	34.8	38.6	42.4	46.1	49.9	53.7	57.5
	50	14.5	16.4	18.3	20.2	22.1	24.0	25.9	29.7	33.4	37.2	41.0	44.8	48.6	52.4	56.2	60.0
	60	17.0	18.9	20.8	22.7	24.6	26.5	28.4	32.2	35.9	39.7	43.5	47.3	51.1	54.9	58.7	62.5
	70	19.5	21.4	23.3	25.2	27.1	29.0	30.9	34.7	38.4	42.2	46.0	49.8	53.6	57.4	61.2	65.0
80	22.0	23.9	25.8	27.7	29.6	31.5	33.4	37.2	40.9	44.8	48.5	52.3	56.1	59.9	63.7	67.5	
90	24.5	26.4	28.3	30.2	32.1	34.0	35.9	39.7	43.4	47.2	51.0	54.8	58.6	62.4	66.2	70.0	
100	27.0	28.9	30.8	32.7	34.6	36.5	38.4	42.2	45.9	49.7	53.5	57.3	61.1	64.9	68.7	72.5	

PER CENT.	2.65	2.84	3.03	3.22	3.41	3.60	3.79	3.98	4.17	4.36	4.55	4.74	4.93	5.12	5.31	5.50	5.69
FEET PER MILE.	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
SPEED IN MILES PER HOUR.	0	53.63	56.82	60.61	64.40	68.18	71.97	75.76	79.55	83.34	87.12	90.92	94.70	98.48	102.27	106.06	113.63
	5	56.3	60.1	63.9	67.7	71.4	75.2	79.0	82.8	86.6	90.4	94.2	98.0	101.8	105.5	109.3	116.9
	10	57.5	61.4	65.1	68.9	72.7	76.5	80.3	84.1	87.9	91.7	95.4	99.2	103.0	106.8	110.6	118.1
	15	58.8	62.6	66.4	70.2	73.9	77.7	81.5	85.3	89.1	92.9	96.7	100.5	104.2	108.0	111.8	119.4
	20	60.1	63.9	67.6	71.4	75.2	79.0	82.8	86.6	90.4	94.2	97.9	101.7	105.5	109.3	113.1	120.7
	25	61.3	65.1	68.9	72.7	76.4	80.2	84.0	87.8	91.6	95.4	99.2	103.0	106.7	110.5	114.3	121.9
	30	62.6	66.4	70.1	73.9	77.7	81.5	85.3	89.1	92.8	96.7	100.4	104.2	108.0	111.8	115.6	123.2
	35	63.8	67.6	71.4	75.1	78.9	82.7	86.5	90.3	94.1	97.9	101.7	105.5	109.3	113.1	116.9	124.5
	40	65.1	68.9	72.6	76.4	80.2	84.0	87.8	91.6	95.3	99.1	102.9	106.7	110.5	114.3	118.1	125.7
	50	67.6	71.4	75.1	78.9	82.7	86.5	90.3	94.1	97.9	101.7	105.5	109.3	113.1	116.9	120.7	128.3
	60	70.1	73.9	77.6	81.4	85.1	88.9	92.7	96.5	100.3	104.1	107.9	111.7	115.5	119.3	123.1	130.7
	70	72.6	76.4	80.1	83.9	87.7	91.5	95.3	99.1	102.9	106.7	110.5	114.3	118.1	121.9	125.7	133.3
	80	75.1	78.9	82.7	86.5	90.3	94.1	97.9	101.7	105.5	109.3	113.1	116.9	120.7	124.5	128.3	135.9

TABLE VI.
RESISTANCE OF CURVES.

DEGREE OF CURVE.	GRADE EQUIVALENTS OF CURVES																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Radius of Curve.	5730	2865	1910	1433	1146	955	819	717	637	574	522	478	442	410	383	359	338	320
Equivalent Grade.	1.32	2.64	3.96	5.28	6.60	7.92	9.24	10.56	11.89	13.22	14.55	15.88	17.21	18.54	19.87	21.20	22.53	23.86

EQUIVALENT GRADE IN FEET PER MILE = 1.32 x degree of curve.

TABLE VII.
SPEED IN MILES PER HOUR.

DIAMETER OF DRIVING WHEELS

REV. PER MIN.	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"	50"	52"	54"	56"	58"	60"	62"	64"	66"	68"	70"	72"	74"	76"	78"	80"	82"	84"
10	1.8	1.8	1.9	2.0	2.1	2.3	2.4	2.5	2.6	2.7	2.9	3.0	3.1	3.2	3.3	3.5	3.6	3.7	3.8	3.9	4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.9	5.0
20	2.5	2.7	2.8	3.0	3.2	3.4	3.6	3.7	3.9	4.1	4.3	4.5	4.6	4.8	5.0	5.2	5.3	5.5	5.7	5.9	6.1	6.2	6.4	6.6	6.8	7.0	7.1	7.3	7.5
30	3.3	3.6	3.8	4.0	4.3	4.5	4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.4	7.6	7.9	8.1	8.3	8.5	8.8	9.0	9.3	9.5
40	4.2	4.5	4.8	5.0	5.3	5.6	5.8	6.0	6.3	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9	9.2	9.5	9.8	10.1	10.4	10.7	11.0	11.3	11.6	11.9	12.2
50	5.0	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.2	8.6	8.9	9.3	9.6	10.0	10.4	10.9	11.1	11.4	11.8	12.1	12.5	12.8	13.2	13.5	13.9	14.3	14.6
60	5.8	6.3	6.7	7.1	7.5	7.9	8.3	8.8	9.2	9.6	10.0	10.4	10.8	11.2	11.7	12.1	12.5	12.9	13.3	13.8	14.1	14.5	14.9	15.3	15.7	16.1	16.5	16.9	17.3
70	6.7	7.1	7.6	8.1	8.6	9.1	9.5	10.0	10.5	10.9	11.4	11.9	12.4	12.8	13.3	13.8	14.3	14.8	15.2	15.7	16.2	16.7	17.1	17.6	18.1	18.6	19.0	19.5	20.0
80	7.7	8.1	8.6	9.1	9.6	10.1	10.6	11.1	11.6	12.1	12.6	13.1	13.6	14.1	14.6	15.1	15.6	16.1	16.6	17.1	17.7	18.2	18.8	19.2	19.8	20.3	20.9	21.4	22.0
90	8.5	8.9	9.5	10.1	10.7	11.3	11.8	12.3	12.9	13.4	13.9	14.5	15.0	15.5	16.1	16.6	17.1	17.6	18.1	18.7	19.2	19.8	20.4	21.0	21.6	22.2	22.8	23.4	24.0
100	9.1	9.8	10.5	11.2	11.8	12.4	13.1	13.7	14.4	15.1	15.7	16.4	17.0	17.7	18.3	19.0	19.6	20.3	21.0	21.7	22.4	23.1	23.8	24.5	25.2	25.9	26.6	27.3	28.0
120	10.1	10.7	11.4	12.2	12.8	13.6	14.3	15.0	15.7	16.4	17.1	17.9	18.6	19.3	20.1	20.9	21.7	22.4	23.2	24.0	24.7	25.5	26.3	27.1	27.8	28.6	29.4	30.2	31.0
130	10.8	11.6	12.4	13.2	13.9	14.7	15.5	16.2	17.0	17.8	18.6	19.3	20.1	20.9	21.7	22.5	23.3	24.1	25.0	25.7	26.6	27.4	28.3	29.1	30.0	30.8	31.6	32.5	33.3
140	11.7	12.5	13.3	14.2	15.0	15.8	16.7	17.5	18.3	19.2	20.0	20.8	21.7	22.5	23.3	24.2	25.0	25.9	26.8	27.7	28.5	29.5	30.3	31.3	32.1	33.0	33.9	34.8	35.7
150	12.5	13.4	14.3	15.2	16.1	17.0	17.9	18.8	19.6	20.5	21.4	22.3	23.2	24.1	25.0	25.9	26.8	27.7	28.6	29.5	30.4	31.3	32.2	33.1	34.0	34.9	35.8	36.7	37.6
160	13.3	14.3	15.2	16.2	17.1	18.1	19.1	20.0	21.0	21.9	22.8	23.8	24.8	25.7	26.7	27.6	28.5	29.5	30.5	31.4	32.4	33.3	34.3	35.3	36.2	37.2	38.1	39.1	40.0
170	14.2	15.2	16.2	17.2	18.2	19.2	20.2	21.2	22.2	23.2	24.2	25.2	26.2	27.2	28.2	29.2	30.2	31.2	32.2	33.2	34.2	35.2	36.2	37.2	38.2	39.2	40.2	41.2	42.0
180	15.0	16.1	17.1	18.1	19.1	20.1	21.1	22.1	23.1	24.1	25.1	26.1	27.1	28.1	29.1	30.1	31.1	32.1	33.1	34.1	35.1	36.1	37.1	38.1	39.1	40.1	41.1	42.1	43.0
190	15.8	17.0	18.1	19.2	20.3	21.4	22.5	23.6	24.7	25.8	26.9	28.0	29.1	30.2	31.3	32.4	33.5	34.6	35.7	36.8	37.9	39.0	40.1	41.2	42.3	43.4	44.5	45.6	46.5
200	16.7	17.9	19.0	20.1	21.3	22.5	23.7	24.9	26.1	27.3	28.5	29.7	30.9	32.1	33.3	34.5	35.7	36.9	38.1	39.3	40.5	41.7	42.9	44.1	45.3	46.5	47.7	48.8	50.0
210	17.5	18.8	20.0	21.3	22.5	23.8	25.0	26.3	27.5	28.8	30.1	31.4	32.8	34.0	35.3	36.7	38.0	39.3	40.6	41.9	43.2	44.5	45.8	47.1	48.4	49.8	51.0	52.4	53.7
220	18.3	19.7	21.0	22.3	23.6	24.9	26.2	27.5	28.8	30.1	31.5	32.9	34.3	35.6	36.9	38.3	39.7	41.1	42.5	43.8	45.2	46.5	47.9	49.2	50.6	52.0	53.4	54.8	56.0
230	19.2	20.6	21.9	23.3	24.6	26.0	27.4	28.8	30.0	31.4	32.8	34.2	35.7	37.1	38.5	40.0	41.5	42.9	44.4	45.7	47.2	48.6	50.0	51.4	52.8	54.2	55.6	57.0	58.5
240	20.0	21.5	22.8	24.3	25.7	27.2	28.6	30.0	31.4	32.8	34.2	35.7	37.2	38.7	40.1	41.7	43.1	44.6	46.1	47.5	49.0	50.5	51.9	53.4	54.9	56.3	57.8	59.3	60.8
250	20.8	22.4	23.8	25.3	26.8	28.3	29.8	31.3	32.8	34.3	35.8	37.3	38.8	40.3	41.8	43.3	44.8	46.3	47.8	49.3	50.8	52.3	53.8	55.3	56.8	58.3	59.8	61.3	62.8
260	21.7	23.3	24.7	26.4	27.9	29.4	31.0	32.5	34.0	35.5	37.0	38.6	40.1	41.7	43.2	44.7	46.2	47.7	49.2	50.7	52.2	53.7	55.2	56.7	58.2	59.7	61.2	62.7	64.2
270	22.5	24.1	25.7	27.4	28.9	30.6	32.2	33.8	35.3	36.9	38.4	40.1	41.8	43.4	45.0	46.6	48.2	49.8	51.4	53.0	54.6	56.2	57.8	59.4	61.0	62.6	64.2	65.8	67.5
280	23.4	25.0	26.6	28.4	30.0	31.7	33.4	35.1	36.8	38.4	40.1	41.8	43.5	45.2	46.9	48.6	50.3	52.0	53.7	55.4	57.1	58.8	60.5	62.2	63.9	65.6	67.3	69.0	70.8
290	24.2	25.9	27.6	29.4	31.2	33.0	34.8	36.6	38.4	40.2	42.0	43.8	45.6	47.4	49.2	51.0	52.8	54.6	56.4	58.2	60.0	61.8	63.6	65.4	67.2	69.0	70.8	72.5	74.3
300	25.0	26.8	28.6	30.5	32.3	34.1	36.0	37.8	39.6	41.4	43.3	45.1	46.9	48.8	50.6	52.5	54.3	56.2	58.0	59.9	61.7	63.6	65.4	67.3	69.1	71.0	72.8	74.7	76.5
310	25.8	27.7	29.5	31.4	33.3	35.2	37.1	39.0	40.9	42.8	44.7	46.6	48.5	50.4	52.3	54.2	56.1	58.0	59.9	61.8	63.7	65.6	67.5	69.4	71.3	73.2	75.1	77.0	78.9
320	26.6	28.6	30.5	32.5	34.5	36.4	38.4	40.3	42.3	44.2	46.2	48.1	50.1	52.0	54.0	55.9	57.9	59.8	61.8	63.7	65.7	67.6	69.6	71.5	73.5	75.4	77.4	79.3	81.3
330	27.5	29.5	31.5	33.5	35.5	37.5	39.5	41.5	43.5	45.5	47.5	49.5	51.5	53.5	55.5	57.5	59.5	61.5	63.5	65.5	67.5	69.5	71.5	73.5	75.5	77.5	79.5	81.5	83.5
340	28.3	30.4	32.4	34.5	36.5	38.6	40.6	42.7	44.7	46.8	48.8	50.9	52.9	54.9	56.9	58.9	60.9	62.9	64.9	66.9	68.9	70.9	72.9	74.9	76.9	78.9	80.9	82.9	84.9
350	29.1	31.3	33.5	35.7	37.9	40.1	42.3	44.5	46.7	48.9	51.1	53.3	55.5	57.7	59.9	62.1	64.3	66.5	68.7	70.9	73.1	75.3	77.5	79.7	81.9	84.1	86.3	88.5	90.7
360	30.0	32.2	34.4	36.6	38.8	41.0	43.2	45.4	47.6	49.8	52.0	54.2	56.4	58.6	60.8	63.0	65.2	67.4	69.6	71.8	74.0	76.2	78.4	80.6	82.8	85.0	87.2	89.4	91.6
370	30.8	33.1	35.3	37.5	39.7	41.9	44.1	46.3	48.5	50.7	52.9	55.1	57.3	59.5	61.7	63.9	66.1	68.3	70.5	72.7	74.9	77.1	79.3	81.5	83.7	85.9	88.1	90.3	92.5
380	31.6	33.9	36.2	38.4	40.7	42.9	45.1	47.3	49.5	51.7	53.9	56.1	58.3	60.5	62.7	64.9	67.1	69.3	71.5	73.7	75.9	78.1	80.3	82.5	84.7	86.9	89.1	91.3	93.5
390	32.4	34.7	37.0	39.3	41.6	43.9	46.2	48.4	50.7	52.9	55.2	57.4	59.6	61.8	64.0	66.2	68.4	70.6	72.8	75.0	77.2	79.4	81.6	83.8	86.0	88.2	90.4	92.6	94.8
400	33.3	35.6	37.9	40.2	42.5	44.8	47.1	49.4	51.7	54.0	56.3	58.6	60.9	63.2	65.5	67.8	70.1	72.4	74.7	76.9	79.2	81.5	83.8	86.1	88.4	90.7	93.0	95.3	97.6

TABLE VIII.
MEAN EFFECTIVE PRESSURE.

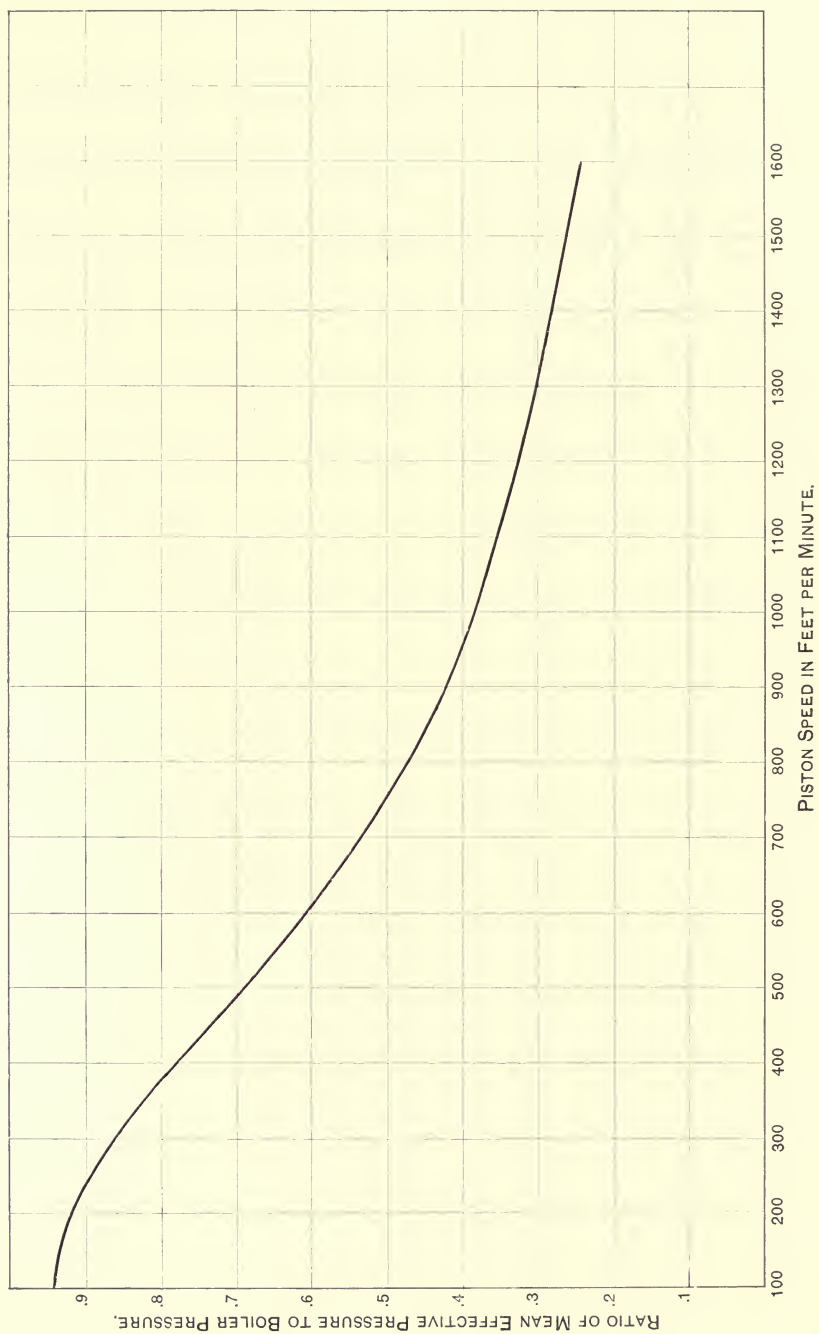
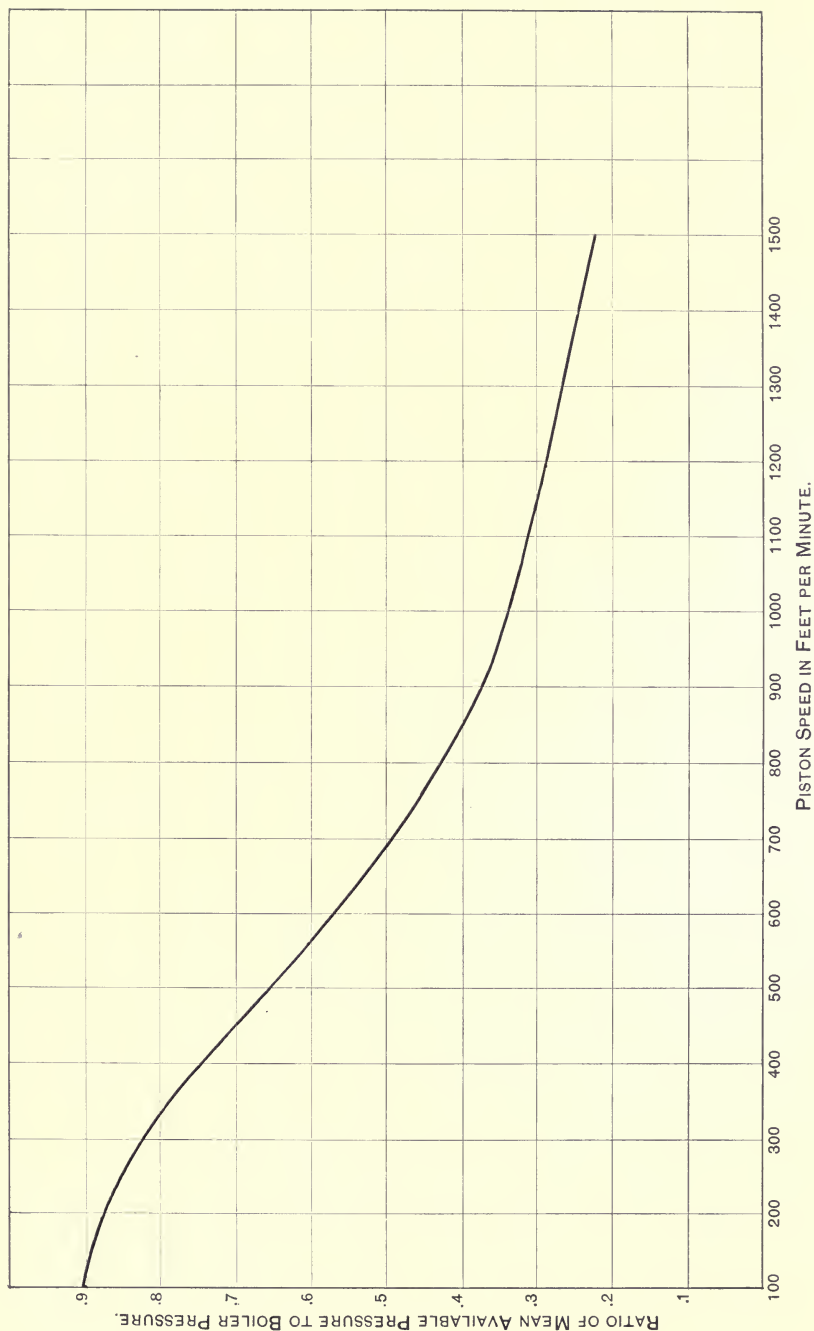


TABLE IX.
MEAN AVAILABLE PRESSURE.



CATALOGUE CIPHER CODE.

CATALOGUE CIPHER CODE.

Code Word	MESSAGE
OAKMAN.....	Wire price, earliest delivery, and mail specifications covering.....locomotives, similar in general design to that described in your 1899 Catalogue, under Code Word.....
OAKUM.....	Wire price, earliest delivery, and mail specifications covering.....locomotives, similar in general design to that described in your 1899 Catalogue, under Code Word.....except.....
OARLOCK.....	Wire price, earliest delivery, and mail specifications covering.....locomotives, duplicates of those last furnished us.....
OASIS.....	Wire price, earliest delivery, and mail specifications covering.....locomotives, duplicates of those last furnished us, except.....
OATH.....	Wire price, earliest delivery, and mail specifications covering.....locomotives, duplicates of those furnished us.....
OBACE.....	Wire price, earliest delivery, and mail specifications covering.....locomotives, duplicates of those furnished us.....except.....
OBACAL.....	We will furnish you..... locomotives, similar in general design to that described in our 1899 Catalogue under Code Word.....for.....dollars each, delivered at.....
OBDALE.....	delivered f. o. b.....
OBDROME.....	delivered alongside vessel, New York Harbor.....
OBDUCE.....	delivered alongside vessel.....
OBED.....	We will furnish you.....locomotives, similar in general design to that described in our 1899 Catalogue under Code Word.....except.....for.....dollars each, delivered at.....
OBEGO.....	delivered f. o. b.....
OBKKO.....	delivered alongside vessel, New York Harbor.....
OBELISK.....	delivered alongside vessel.....
OBELLUM.....	We will furnish you.....locomotives, duplicates of those we furnished you.....for.....dollars each, delivered at.....
OBELUS.....	delivered f. o. b.....
OBERON.....	delivered alongside vessel, New York Harbor.....
OBERUS.....	delivered alongside vessel.....
OBESE.....	We will furnish you.....locomotives, duplicates of those we furnished you.....except.....for.....dollars each, delivered at.....
OBEY.....	delivered f. o. b.....
OBIME.....	delivered alongside vessel New York Harbor.....
OBIT.....	delivered alongside vessel.....
OBITER.....	We will furnish you.....locomotives, duplicates of those we last furnished you, for.....dollars each, delivered at.....
OBJOIN.....	delivered f. o. b.....
OBKALE.....	delivered alongside vessel New York Harbor.....
OBELATE.....	delivered alongside vessel.....
OBLATION.....	We will furnish you.....locomotives, duplicates of those we last furnished you, except.....for.....dollars each, delivered at.....
OBLAW.....	delivered f. o. b.....
OBLESE.....	delivered alongside vessel, New York Harbor.....
OBLETTO.....	delivered alongside vessel.....
OBLEVOR.....	Quotation is for plain engine only. By a plain engine is meant one having steel fire-box, charcoal iron tubes, steel tyred driving wheels and cast iron engine truck (bogie) and tender truck wheels. It does not include brakes, copper fire box, brass tubes, headlights or other extras as coded on pages 326 and 327 of this catalogue.
OBLICEE.....	Are you prepared to tender for.....locomotives, similar in general design to that described in your 1899 Catalogue, under Code Word.....for delivery not later than.....?
OBLINK.....	We will submit tender by first outgoing mail, covering.....locomotives, similar in general design to that described in our 1899 Catalogue, under Code Word.....delivery.....
OBLIQUE.....	Are you prepared to tender for.....locomotives, similar in general design to that described in your 1899 Catalogue, under Code Word.....except.....for delivery not later than.....?
OBLONG.....	We will submit tenders by first outgoing mail covering.....locomotives, similar in general design to that described in your 1899 Catalogue under Code Word.....except.....delivery.....
OBLUS.....	We are unable to tender. Have written.
OBOE.....	Enter our order for.....locomotives, as described under Code Word.....

CATALOGUE CIPHER CODE.—(Continued.)

Code Word	MESSAGE
OBOLO	Enter our order for.....locomotives, as described under Code Word..... except.....
OBSCURE	Enter our order for.....locomotives, duplicates of those last furnished us.
OBSEQUY	Enter our order for.....locomotives, duplicates of those last furnished us, except.....
OBSERT	Enter our order for.....locomotives, duplicates of those furnished us.....
OBSESS	Enter our order for.....locomotives, duplicates of those furnished us..... except.....
OBSIGN	Enter our order for.....locomotives, as per $\left. \begin{matrix} \text{our} \\ \text{my} \end{matrix} \right\}$ message of..... and your answer of.....
OBSOLETE	Enter our order. Have written.
OB SOLTE	Have entered order, will confirm by mail.
OBSTAB	If specifications can be modified to read.....our price will be.....dollars.
OBSTACLE	If specifications can be modified to read.....we will tender.
OBSTADIO	You may modify specifications to read.....
OBSTADIX	Specifications cannot be modified.
OBSTELT	Omit from the construction.....
OBSTINATE	Omit from the construction.....and include.....
OBSTINT	Tenders will be opened.....
OBSTIPO	Your tender must be here not later than.....
OBSTIQUE	We will cable proposal.....
OBSTUDO	We will mail proposal.....
OBSTUM	Our proposal mailed.....
OBTATE	We desire shipment via steamer.....which will receive freight on or about.....
OBTAX	We will arrange to make shipment via steamer.....as desired.
OBTEGO	We will make shipment via steamer.....if possible.
OBTEMMO	Impossible to make shipment via steamer.....
OBTEND	Cannot make shipment in time for steamer.....will ship by next boat.
OBTENGO	Shipment of.....locomotives made to-day.
OBTEPPO	Will make shipment of.....locomotives.....
OBTERT	Locomotives will go forward on steamer.....
OBTEST	Have locomotives arrived at.....?
OBTEVAL	Will locomotives be completed within the specified time?
OBTEW	The locomotives will be completed within the specified time.
OBTRAND	We can complete the locomotives within the time specified, if complete details are furnished at once.
OBTRAP	Impossible to complete engines within the time specified. Have written.
OBTRAP SIT .....	.....locomotives now completed.
OBTRARRO .....	.....locomotives completed to-day.
OBTRARTAL	Can you make delivery of.....locomotives within.....months?
OBTRASCO	Name earliest delivery.....
OBTRASCUM	Name earliest delivery alongside New York.
OBTRAST	Name earliest delivery alongside.....
OBTRATOR	Earliest delivery alongside New York.....
OBTRESTO	Earliest delivery alongside.....
OBTRELT	Earliest delivery.....
OBTRISM	Delivery not later than.....
OBTRITIO	Delivery not earlier than.....
OBTRIVO	Delivery about.....
CONSTRUCTION.	
OBTRUDE	Locomotives to have cylinders one-half inch larger diameter.
OBTRUFF	Locomotives to have cylinders one inch larger diameter.
OBTRUGAL	Locomotives to have cylinders.....inches larger diameter.
OBTRUGAM	Locomotives to have cylinders one-half inch smaller diameter.
OBTRUGIO	Locomotives to have cylinders one inch smaller diameter.
OBTRUNK	Locomotives to have cylinders.....inches smaller diameter.
OBTRUST	Locomotives to have stroke of piston.....inches longer.

CATALOGUE CIPHER CODE.— (Continued.)

Code Word	MESSAGE
OBTRUX	Locomotives to have stroke of piston.....inches shorter.
OBTUSE.....	Locomotives to have diameter of cylinders and stroke of piston of same dimensions as engine described in $\left\{ \begin{array}{l} \text{your } \{ \\ \text{our } \{ \end{array} \right.$ 1899 Catalogue under Code Word.....
OBTUTO.....	Locomotives to be equipped with Brooks Improved Piston Valves.
OBVANO	Locomotives to have driving wheels.....inches diameter.
OBVAMPO	Locomotives to have engine truck (bogie) wheels.....inches diameter.
OBVERSE.....	Locomotives to have Player Patent Improved Belpaire Boilers.
OBVERT	Locomotives to have Radial Stay Wagon Top Boilers.
OBVESCO	Locomotives to have Straight Top Boilers.
OBVESTIT	Gauge of track.....inches.
OBVETOR	Gauge of track.....millimeters.
OBVETUM.....	Driving wheel base must not exceed.....inches.
OBVEXOR.....	Driving wheel base must not exceed.....millimeters.
OBVIBOR	Rigid wheel base must not exceed.....inches.
OBVICA	Rigid wheel base must not exceed.....millimeters.
OBVIDIA	Total wheel base of engine must not exceed.....inches.
OBVIDORE.....	Total wheel base of engine must not exceed.....millimeters.
OBVIDUNT	Total wheel base of engine and tender must not exceed.....inches.
OBVIDUS.....	Total wheel base of engine and tender must not exceed.....millimeters.
OBVIDUTO.....	Total weight of engine must not exceed .....pounds in working order.
OBVIGANT	Total weight of engine must not exceed.....kilogrammes in working order.
OBVIGO	Total weight on drivers.....pounds in working order.
OBVIGUST.....	Total weight on drivers.....kilogrammes in working order.
OBVIMAL	Total weight of tender, loaded.....pounds.
OBVIMET.....	Total weight of tender, loaded.....kilogrammes.
OBVIMUS.....	Height of engine from top of rail must not exceed.....inches.
OBVITO	Height of engine from top of rail must not exceed.....millimeters.
OBVITULE.....	Must have tank capacity of.....U. S. gallons.
OBVITUM	Must have tank capacity of.....imperial gallons.
OBVUNT.....	Must have tank capacity.....cubic inches.
OBVUTO.....	Must have tank capacity.....liters.
OBVUTUS.....	Fuel, bituminous coal.
OBVUVUM.....	Fuel, anthracite coal.
OCADIA	Fuel, wood or coal.
OCADOR.....	Fuel, wood.
OCADUS.....	What is the estimated cubical measurement of each engine knocked down and packed for sea shipment?
OCAFAD	The estimated cubical measurement of each engine knocked down and packed for sea shipment is.....cubic feet.
OCFALE	is.....cubic decimeters.
OCAFAMO.....	What is the estimated weight of each engine knocked down and packed for sea shipment?
OCAFARN.....	The estimated weight of each engine knocked down and packed for sea shipment is.....pounds.
OCAFAROD.....	is.....kilogrammes.
OCAGON.....	What is the weight of heaviest piece?
OCAGUNT	The weight of heaviest piece is.....pounds.
OCALA.....	is.....kilogrammes.
OCALOT.....	What is measurement of bulkiest piece?
OCALUX.....	The measurement of bulkiest piece is.....
OCAMON.....	What is the weight per yard of rail on which engines are to run?
OCAMUS	Weight of rail per yard is.....pounds.
OCATOR.....	is.....kilogrammes.
OCBANAL.....	What is heaviest grade?
OCBARAL	Heaviest grade does not exceed.....feet in 100 feet.
OCBARRO	Heaviest grade does not exceed.....feet per mile.
OCCASION	What is length of heaviest grade?
OCCATRUM	Length of heaviest grade does not exceed.....feet.
OCCAVUS.....	What is radius of sharpest curve?
OCCIDENT.....	Radius of sharpest curve does not exceed .....feet.
OCCIDO.....	.....millimeters.

CATALOGUE CIPHER CODE.— (Continued.)

Code Word	MESSAGE
OCCIPITAL	What is length of turntable?
OCCIPUT.....	Length of turntable is.....feet.
OCCITUM.....	.....millimeters.
OCCITUS	Send dimensions of smallest tunnel.
OCCLUDE	Send profile of road.
OCCULT	Wire at once lettering and numbering for locomotives.
OCCULUS	Letter locomotives as follows :
OCCUMAS.....	Number locomotives as follows :
OCCUMOID.....	Cost of freight and insurance from New York is.....dollars.
OCCUMOLO.....	Cost of freight and insurance from.....is.....dollars.

EXTRA EQUIPMENT.

OCCUPANT.....	Include the following extra equipment in your tender ;
OCCUPATE.....	Quote price at which you will furnish the following extra equipment, per engine.
OCCUPEDE	Quotation includes the following extra equipment.....
OCCUPULT	Extra equipment for each engine will cost as follows :
OCCUPY	You may furnish and apply to each of the engines you have under construction for us, the following extra equipment, at the price you have quoted for same.
OCCUPYOR.....	To price quoted add for extra equipment for each engine as follows.

BRAKES.

OCCUR	Hand brakes on drivers.
OCEAN	Steam brakes on drivers.
OCEANIC	Hand and steam driver brakes.
OCELLUS	American steam driver brake.
OCELOT.....	American steam engine truck brake.
OCHRE.....	Westinghouse tender brake.
OCHRY	Westinghouse train brake.
OCREA	Westinghouse tender and train brake, 8-inch pump.
OCREATE	Westinghouse tender and tender brake, 9½-inch pump.
OCTAD.....	American-Westinghouse driver, tender and train brake, 8-inch pump.
OCTAGON.....	American-Westinghouse driver, tender and train brake, 9½-inch pump.
OCTANDER	New York air brake on drivers.
OCTANE.....	New York air brake on tender.
OCTANT.....	New York air brake on train.
OCTASTYLE.....	New York air brake on tender and train.
OCTAVE.....	New York air brake on drivers, tender and train.
OCTENE.....	Eames vacuum brake on drivers.
OCTET.....	Eames vacuum brake on tender.
OCTIC	Eames vacuum brake on train.
OCTILE.....	Eames vacuum brake on tender and train.
OCTILLION.....	Eames vacuum brake on drivers, tender and train.
OCTOATE	Smith automatic brake on drivers.
OCTODONT	Smith automatic brake on tender.
OCTOFID.....	Smith automatic brake on train.
OCTOIC.....	Smith automatic brake on tender and train.
OCTONARY.....	Smith automatic brake on drivers, tender and train.
OCTOPUS.....	American practice.
OCTOROON.....	Railway Co.'s practice.

BOILER COVERING.

OCTOYL	Asbestos board.
OCTUPLE	Asbestos cement.
OCULAR.....	Sectional asbestos.
OCULATE	Sectional magnesia.
OCULIST	John's fire felt.

CATALOGUE CIPHER CODE.— (Continued.)

Code Word	MESSAGE
OCTULUS	BELL RINGER — Gollmar.
OCTUSTER	— Heginbottom.
OCCUTOR.....	— Sansom.
	COUPLERS.
ODALISQUE	American automatic M. C. B. standard.
ODALIX	Screw — English practice.
	FIRE-BOX.
ODAPAX.....	Copper fire-box, brass tubes.
ODAX.....	Copper fire-box, iron tubes.
	HEADLIGHTS.
ODDITY	Ordinary American pattern, square case, 18-inch reflector.
ODDS.....	Ordinary American pattern, round case, 18-inch reflector.
ODE.....	Ordinary American pattern, square case, 23-inch reflector.
ODEON.....	Ordinary American pattern, round case, 23-inch reflector.
ODIC.....	Special pattern.
ODIN.....	Electric (National).
ODINIC.	Electric (Pyle National).
ODIOUS	Three head lamps (Japanese style).
	JACKS, TRAVERSING.
ODIST	Ten tons capacity.
ODIUMAL.....	Twelve tons capacity.
ODIZE.....	Fifteen tons capacity.
	SANDING DEVICE.
ODMYL.....	Leach sander, single pipe.
ODONTO.....	Leach sander, double pipe.
ODONTOAX	Houston sander.
ODONTOID.....	SYPHON, with.....feet of hose.
	TIRES.
ODOPARE.....	Krupp, crucible.
ODOPASS.....	Krupp, open hearth.
ODOR	TRACINGS, one set.
ODORANT	two sets.
ODORINE.....	three sets.
ODOROUS.....	TRAIN SIGNAL, Westinghouse.
ODYLIC.....	WRECKING FROGS, one.
ODYLINE	one pair.

CALENDAR CODE.

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
1	Nab.	Napus.	Natch.	Navew.	Needle.	Neocene.
2	Nabit.	Narcosis.	Nates.	Navicular.	Needy.	Neocracy.
3	Nabob.	Narcotic.	Nath.	Navigable.	Neese.	Neogen.
4	Nacre.	Narcotine.	Nathmore.	Navigate.	Nefand.	Neology.
5	Nadir.	Narcotism.	Natica.	Navy.	Nefast.	Neomorph.
6	Nagor.	Nard.	Naticord.	Nawab.	Negation.	Neonism.
7	Naid.	Nardine.	Nation.	Nawl.	Negative.	Neophyte.
8	Naik.	Nardoo.	National.	Nayt.	Neginoth.	Neoplasm.
9	Nail.	Nares.	Native.	Nazarene.	Neglect.	Neorama.
10	Nainsook.	Nargile.	Nativity.	Nazarite.	Negligee.	Neoteric.
11	Nais.	Narica.	Natka.	Naze.	Negoce.	Neozoic.
12	Naive.	Narifform.	Natrium.	Neal.	Negress.	Nepa.
13	Naked.	Narine.	Natralite.	Neap.	Negritta.	Nepenthe.
14	Naker.	Narrate.	Natron.	Nearctic.	Negritic.	Nephew.
15	Nakoo.	Narrative.	Natter.	Neat.	Negro.	Nephrite.
16	Nale.	Narrator.	Natty.	Nebalia.	Negroid.	Nepotic.
17	Namby.	Narthex.	Natural.	Nebular.	Negus.	Nepotism.
18	Namo.	Narwal.	Nature.	Nebule.	Neif.	Neptune.
19	Nandine.	Nasal.	Naufrage.	Nebulose.	Neigh.	Nereid.
20	Nandu.	Nascal.	Naught.	Neck.	Neighbor.	Nerita.
21	Nankeen.	Nascent.	Naughty.	Neckband.	Nelumbo.	Nero.
22	Nanny.	Nash.	Nausea.	Necking.	Nemaline.	Nervate.
23	Nanpie.	Nasiform.	Nauseate.	Necklet.	Nemato.	Nerve.
24	Naos.	Nasion.	Nautch.	Necktie.	Nematoid.	Nervine.
25	Nape.	Nassa.	Nautic.	Necrolite.	Nemean.	Nervous.
26	Naphtha.	Nasute.	Nautical.	Necrose.	Nemertid.	Nescience.
27	Naphthol.	Natal.	Nautiform.	Necrotic.	Nemesis.	Nesh.
28	Napkin.	Natalin.	Nautilus.	Nectar.	Nemoral.	Nest.
29	Napless.	Natant.	Naval.	Nectarine.	Nempne.	Nestle.
30	Nappe.	.....	Navarch.	Nedder.	Nenia.	Nestor.
31	Napping.	.....	Nave.	.....	Nentor.	.....

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	Netfish.	Nickar.	Nimmer.	Nocive.	Nomadic.	Noontide.
2	Nether.	Nickel.	Ninefold.	Nock.	Nomarch.	Noose.
3	Netify.	Nicking.	Ninny.	Noctam.	Nombril.	Nopal.
4	Netting.	Nickname.	Niobate.	Noctuid.	Nome.	Norian.
5	Nettle.	Nicotic.	Niobe.	Noctule.	Nomen.	Norite.
6	Netty.	Nicotine.	Niobium.	Nocturne.	Nomial.	Norma.
7	Network.	Nictate.	Nipper.	Nocturnal.	Nomic.	Normal.
8	Neural.	Nidary.	Nipping.	Nocuous.	Nominal.	Norse.
9	Neuralgia.	Nide.	Nipple.	Nod.	Nominate.	Nosel.
10	Neuraxis.	Nidget.	Nirvana.	Nodal.	Nominee.	Nostril.
11	Neurine.	Niding.	Nisan.	Nodation.	Nonage.	Nostrum.
12	Neuro.	Nidor.	Niste.	Nodder.	Nonagon.	Notable.
13	Neuroma.	Nidulate.	Nisus.	Noddle.	Nonane.	Notary.
14	Neuron.	Nidus.	Niter.	Noddy.	Nonce.	Notarial.
15	Neurosis.	Niece.	Nitrate.	Node.	Nonda.	Notate.
16	Neurotic.	Nief.	Nitride.	Nodical.	Nonego.	Notch.
17	Neuter.	Niello.	Nitrify.	Nodular.	Nones.	Notion.
18	Neutral.	Niggard.	Nitrile.	Nodule.	Nonetto.	Notist.
19	Newel.	Niggle.	Nitroform.	Noel.	Nonus.	Notum.
20	Newsboy.	Nigh.	Nitrol.	Noemic.	Nonoic.	Nouch.
21	Newt.	Night.	Nitrum.	Noetic.	Nonpareil.	Nougat.
22	Newton.	Nightfall.	Nivose.	Nog.	Nonplus.	Nounal.
23	Nexible.	Nightmare.	Nixie.	Noggin.	Nonsane.	Nourish.
24	Nexus.	Nightshade.	Noah.	Noils.	Nonsense.	Noursel.
25	Nias.	Nigrine.	Nobby.	Noise.	Nonsuit.	Novation.
26	Nibble.	Nihil.	Noble.	Noisette.	Nonylic.	Novel.
27	Nicolite.	Nilotic.	Nobility.	Noisome.	Noodle.	Novelist.
28	Nicene.	Nilt.	Noblesse.	Nolde.	Nook.	Novice.
29	Nicety.	Nimble.	Nobley.	Nole.	Noon.	Novitiate.
30	Niche.	Nimbose.	Nocent.	Nolition.	Noonday.	Noxious.
31	Nick.	Nimbus.	.....	Nomad.	.....	Noyance.

NUMERICAL CODE.

1	Sabal.	68	Salebrous.	150	Sanga.	232	Satiate.	314	Scantling.
2	Sabaoth.	69	Salep.	151	Sangaree.	233	Satiety.	315	Scape.
3	Sabbat.	70	Salic.	152	Sangiac.	234	Satinet.	316	Scaphite.
4	Sabeau.	71	Salicin.	153	Sanguine.	235	Satin.	317	Scaphoid.
5	Sabella.	72	Salicyl.	154	Sanhita.	236	Sation.	318	Scapple.
6	Sabre.	73	Salient.	155	Sanicle.	237	Satire.	319	Scapula.
7	Sabian.	74	Saliferous.	156	Sanidine.	238	Satirist.	320	Scapulet.
8	Sabine.	75	Salify.	157	Sanious.	239	Satisfy.	321	Scar.
9	Sable.	76	Saligat.	158	Sanitary.	240	Sative.	322	Scarab.
10	Sabot.	77	Salina.	159	Sanity.	241	Satrap.	323	Scarce.
11	Sabulose.	78	Salique.	160	Sanjak.	242	Saturate.	324	Scarcity.
12	Sac.	79	Salite.	161	Sankha.	243	Saturn.	325	Scard.
13	Sac.	80	Saliva.	162	Sannup.	244	Saturnian.	326	Scarf.
14	Sacalai.	81	Salivant.	163	Sanscrit.	245	Saturnine.	327	Scarify.
15	Sacar.	82	Salivate.	164	Santal.	246	Satyr.	328	Scarlet.
16	Saccharin.	83	Salix.	165	Santee.	247	Satyr.	329	Scarmage.
17	Saccharoid.	84	Sallet.	166	Santee.	248	Sauce.	330	Scarp.
18	Saccharum.	85	Sallow.	167	Santon.	249	Saucisse.	331	Scary.
19	Sacchalic.	86	Sally.	168	Santon.	250	Saucy.	332	Scarus.
20	Sacchulmic.	87	Salui.	169	Sap.	251	Sauger.	333	Scatch.
21	Sacciform.	88	Salmiac.	170	Sapan.	252	Saul.	334	Scathe.
22	Saccule.	89	Salmon.	171	Sapful.	253	Sauter.	335	Scatter.
23	Sacculus.	90	Salmonet.	172	Sapid.	254	Saurel.	336	Scamp.
24	Saccus.	91	Salogen.	173	Sapient.	255	Saurian.	337	Scavenger.
25	Sacellum.	92	Salol.	174	Sapless.	256	Saurid.	338	Scolet.
26	Sacerdos.	93	Saloon.	175	Sapling.	257	Saury.	339	Scome.
27	Sacchem.	94	Salpa.	176	Saponity.	258	Sausage.	340	Scornery.
28	Sacchet.	95	Salpicon.	177	Saponite.	259	Sauterne.	341	Scenic.
29	Sack.	96	Salpinx.	178	Sapor.	260	Savage.	342	Scen.
30	Sackbut.	97	Salse.	179	Saporific.	261	Savagism.	343	Scenless.
31	Sackcloth.	98	Salsify.	180	Sapota.	262	Savant.	344	Scepter.
32	Sacking.	99	Salsoda.	181	Sapper.	263	Savement.	345	Schedule.
33	Sacque.	100	Salt.	182	Sapphic.	264	Savor.	346	Scheme.
34	Sacral.	101	Saltant.	183	Sapphire.	265	Savory.	347	Schemer.
35	Sacrament.	102	Saltation.	184	Sappho.	266	Sawbill.	348	Schism.
36	Sacrate.	103	Saltatory.	185	Sappy.	267	Sawbuck.	349	Scholar.
37	Sacre.	104	Saltern.	186	Sapsago.	268	Sawdust.	350	Scholium.
38	Sacred.	105	Saltpetre.	187	Saraband.	269	Sawfly.	351	School.
39	Sacrifice.	106	Salubrity.	188	Saracen.	270	Sawmill.	352	Schooner.
40	Sacrilege.	107	Salutary.	189	Sarcasm.	271	Sawset.	353	Sciatic.
41	Sacrist.	108	Salute.	190	Sarcastic.	272	Sawyer.	354	Science.
42	Sacristan.	109	Salvable.	191	Sarcel.	273	Saxatile.	355	Scientist.
43	Sacrum.	110	Salvage.	192	Sarcenet.	274	Saxhorn.	356	Scimitar.
44	Sadden.	111	Salvation.	193	Sarcin.	275	Saxifrage.	357	Scintilla.
45	Saddle.	112	Salvatory.	194	Sarcina.	276	Saxon.	358	Sciolist.
46	Saddlery.	113	Salver.	195	Sarcle.	277	Sarcode.	359	Scion.
47	Sadducee.	114	Salvitic.	196	Sarcoblast.	278	Sarcoderm.	360	Scioptic.
48	Sadiron.	115	Salvo.	197	Sarcoma.	279	Sarcosis.	361	Scissel.
49	Safeguard.	116	Samara.	198	Sarcotie.	280	Sarcastic.	362	Scissors.
50	Safety.	117	Samaroid.	199	Sarcode.	281	Scab.	363	Sclerite.
51	Saffron.	118	Samaritan.	200	Sargasso.	282	Scabby.	364	Scoff.
52	Saffranin.	119	Sambo.	201	Sard.	283	Scabhard.	365	Scold.
53	Saga.	120	Sambuke.	202	Sard.	284	Scabbling.	366	Scolex.
54	Sagacity.	121	Sambur.	203	Sard.	285	Scad.	367	Scomber.
55	Sagamore.	122	Samian.	204	Sardel.	286	Scaffold.	368	Sconce.
56	Sagapen.	123	Samiel.	205	Sardine.	287	Scaglia.	369	Scoop.
57	Sage.	124	Samite.	206	Sardins.	288	Scal.	370	Scoot.
58	Sagene.	125	Samlet.	207	Sardonic.	289	Scald.	371	Scope.
59	Sagenite.	126	Samoan.	208	Sardonyx.	290	Scaldic.	372	Scoppet.
60	Sagger.	127	Samovar.	209	Sargasso.	291	Scale.	373	Scorbut.
61	Saginate.	128	Samp.	210	Sargo.	292	Scalene.	374	Scorch.
62	Sagitta.	129	Sampan.	211	Sark.	293	Scaling.	375	Score.
63	Sago.	130	Samphire.	212	Sarkin.	294	Scalld.	376	Scoria.
64	Sagum.	131	Sample.	213	Sarlac.	295	Scallion.	377	Scorify.
65	Sahib.	132	Samsboo.	214	Sarmatic.	296	Scallop.	378	Scorn.
66	Sahidic.	133	Samson.	215	Sarment.	297	Scalp.	379	Scornful.
67	Saie.	134	Sanative.	216	Sarong.	298	Scalpel.	380	Scorpene.
68	Saikyr.	135	Sanatory.	217	Saros.	299	Scalper.	381	Scorpio.
69	Sailor.	136	Sanctify.	218	Sarplar.	300	Scaly.	382	Scorpion.
70	Saimir.	137	Sanction.	219	Sarsa.	301	Scamble.	383	Scorse.
71	Sainfoin.	138	Sanctity.	220	Sarsen.	302	Scamillus.	384	Scotch.
72	Saint.	139	Sanctum.	221	Sart.	303	Scamp.	385	Scoter.
73	Saintlike.	140	Sand.	222	Sash.	304	Scamper.	386	Scotist.
74	Saithie.	141	Sandal.	223	Sasin.	305	Scan.	387	Scotomy.
75	Saiva.	142	Sandarac.	224	Sassafras.	306	Scandal.	388	Scotsman.
76	Sajene.	143	Sandix.	225	Sassolin.	307	Scandent.	389	Scottish.
77	Saker.	144	Sandman.	226	Sastra.	308	Scandia.	390	Scoundrel.
78	Saki.	145	Sandre.	227	Satan.	309	Scandic.	391	Scour.
79	Salaam.	146	Sandwich.	228	Satanic.	310	Scansion.	392	Scourge.
80	Salad.	147	Sandwort.	229	Satchel.	311	Scant.	393	Scout.
81	Salagane.	148	Sandyx.	230	Sate.	312	Scantily.	394	Scowl.
82	Salary.	149	Sane.	231	Satellite.	313	Scantle.	395	Scrabble.

NUMERICAL CODE.—(Continued.)

396	Scrag.	478	Secure.	560	Serang.	642	Shatter.	724	Siccate.
397	Scraggy.	479	Sedate.	561	Serape.	643	Shave.	725	Sickish.
398	Scramble.	480	Sedative.	562	Seraph.	644	Shaveling.	726	Sickle.
399	Scrape.	481	Sedge.	563	Seraphic.	645	Shaving.	727	Sickly.
400	Scrappy.	482	Sediment.	564	Seraphim.	646	Shawl.	728	Sideral.
401	Scratch.	483	Sedition.	565	Serapis.	647	Shawnee.	729	Siderite.
402	Scrawl.	484	Sedum.	566	Serenade.	648	Sheaf.	730	Sidewise.
403	Scrawny.	485	Seedless.	567	Serene.	649	Shealing.	731	Siege.
404	Scream.	486	Seedtime.	568	Serenity.	650	Shearer.	732	Sienna.
405	Screech.	487	Seeker.	569	Serge.	651	Shears.	733	Sierra.
406	Creed.	488	Seeming.	570	Sergeant.	652	Sheath.	734	Siesta.
407	Screen.	489	Seemly.	571	Serial.	653	Shedder.	735	Sieve.
408	Screw.	490	Seer.	572	Seriation.	654	Sheen.	736	Sifter.
409	Scribble.	491	Seesaw.	573	Sericite.	655	Sheepcot.	737	Sigh.
410	Scribbling.	492	Seethe.	574	Sermon.	656	Sheepfold.	738	Sightless.
411	Scribe.	493	Segment.	575	Sermonic.	657	Sheepish.	739	Sigil.
412	Scrim.	494	Segregate.	576	Serosity.	658	Sheepskin.	740	Sigma.
413	Scrimmage.	495	Seignor.	577	Serous.	659	Sheik.	741	Sigmoid.
414	Scrimp.	496	Seismic.	578	Serpent.	660	Shekel.	742	Siguate.
415	Script.	497	Seismal.	579	Serrate.	661	Shekinah.	743	Signet.
416	Scriptory.	498	Seizure.	580	Serrator.	662	Sheller.	744	Silence.
417	Scripture.	499	Sekos.	581	Serried.	663	Shellfish.	745	Silent.
418	Scrofula.	500	Selah.	582	Serum.	664	Shelter.	746	Silenus.
419	Scroggy.	501	Seldom.	583	Servage.	665	Shelve.	747	Silex.
420	Scroll.	502	Select.	584	Serval.	666	Shool.	748	Silken.
421	Scrub.	503	Selection.	585	Servant.	667	Shepherd.	749	Sillock.
422	Scruple.	504	Selenic.	586	Servile.	668	Sherbet.	750	Silo.
423	Scrutator.	505	Selenite.	587	Servitude.	669	Sheriff.	751	Silurian.
424	Scrutiny.	506	Selfish.	588	Sesame.	670	Sherry.	752	Silvan.
425	Saddle.	507	Selfsame.	589	Sesamoid.	671	Shield.	753	Silvate.
426	Suff.	508	Selfwill.	590	Sesban.	672	Shifter.	754	Simian.
427	Suffle.	509	Selvage.	591	Sessile.	673	Shiftless.	755	Simile.
428	Sculler.	510	Semaphore.	592	Session.	674	Shiloh.	756	Simmer.
429	Scullion.	511	Senatrope.	593	Sesterce.	675	Shimmer.	757	Simony.
430	Sculpin.	512	Semblance.	594	Sethia.	676	Shindy.	758	Simoom.
431	Sculptor.	513	Semester.	595	Seton.	677	Shine.	759	Simper.
432	Sculpture.	514	Semitic.	596	Settee.	678	Shiner.	760	Simplist.
433	Scum.	515	Semitone.	597	Setter.	679	Shingle.	761	Simulate.
434	Scupper.	516	Senate.	598	Setula.	680	Shinto.	762	Sinapine.
435	Scurf.	517	Senegal.	599	Sever.	681	Shirk.	763	Sincere.
436	Scurry.	518	Senile.	600	Severe.	682	Shirting.	764	Sinch.
437	Scurvy.	519	Senior.	601	Sewage.	683	Shiver.	765	Sindon.
438	Scutal.	520	Senna.	602	Sewer.	684	Shoal.	766	Sinecure.
439	Scutcheon.	521	Sennet.	603	Sextain.	685	Shoat.	767	Sinew.
440	Scutella.	522	Senora.	604	Sextant.	686	Shoddy.	768	Sinful.
441	Scuttle.	523	Sensate.	605	Sextette.	687	Shogun.	769	Singer.
442	Scutum.	524	Sensation.	606	Sextile.	688	Shola.	770	Singleton.
443	Scylla.	525	Sense.	607	Sexton.	689	Shoot.	771	Sinister.
444	Scythe.	526	Senseless.	608	Shabby.	690	Shopman.	772	Sinker.
445	Seacoal.	527	Sensitive.	609	Shack.	691	Shopworn.	773	Sinner.
446	Seagirt.	528	Sensor.	610	Shackle.	692	Shortage.	774	Sinless.
447	Seal.	529	Sensorium.	611	Shad.	693	Shorthand.	775	Sinoper.
448	Seam.	530	Sensory.	612	Shadow.	694	Shotted.	776	Sinque.
449	Seaman.	531	Sensuous.	613	Shady.	695	Shoulder.	777	Sinuate.
450	Seamless.	532	Sentence.	614	Shaffle.	696	Shout.	778	Sinus.
451	Seamster.	533	Sentient.	615	Shag.	697	Shove.	779	Siphoid.
452	Seance.	534	Sentiment.	616	Shaggy.	698	Shovel.	780	Sipid.
453	Sear.	535	Sentinel.	617	Shagreen.	699	Shower.	781	Sipple.
454	Search.	536	Sentry.	618	Shaken.	700	Showman.	782	Sircar.
455	Seasick.	537	Sepal.	619	Shaker.	701	Shrapnel.	783	Siren.
456	Season.	538	Sepaline.	620	Shako.	702	Shrew.	784	Sirius.
457	Seat.	539	Separator.	621	Shale.	703	Shrewish.	785	Sirloin.
458	Sebate.	540	Separatrix.	622	Shallop.	704	Shriek.	786	Sirocco.
459	Sebic.	541	Sepia.	623	Shallow.	705	Shrieve.	787	Sirrah.
460	Secant.	542	SePOSE.	624	Sham.	706	Shrift.	788	Sisal.
461	Secede.	543	Sepoy.	625	Shaman.	707	Shrill.	789	Siskin.
462	Secession.	544	Sepsin.	626	Shamble.	708	Shrimp.	790	Sister.
463	Seckel.	545	Sepsis.	627	Shame.	709	Shrine.	791	Sistine.
464	Seclude.	546	Septate.	628	Shameful.	710	Shrivel.	792	Sistrum.
465	Seclusion.	547	Septette.	629	Shammer.	711	Shroud.	793	Situate.
466	Secrecy.	548	Septic.	630	Shamoi.	712	Shrub.	794	Situs.
467	Secret.	549	Septiform.	631	Shampoo.	713	Shrug.	795	Sivan.
468	Secretary.	550	Septoic.	632	Shamrock.	714	Shuck.	796	Sizar.
469	Secretion.	551	Septulate.	633	Shank.	715	Shudder.	797	Sizzle.
470	Sect.	552	Septulum.	634	Shanty.	716	Shuffle.	798	Skag.
471	Sectarian.	553	Septum.	635	Shapely.	717	Shumac.	799	Skaldic.
472	Sectary.	554	Septulcher.	636	Shard.	718	Shutter.	800	Skate.
473	Sectile.	555	Sequel.	637	Shark.	719	Shuttle.	801	Skean.
474	Section.	556	Sequence.	638	Sharock.	720	Shyster.	802	Skcel.
475	Sector.	557	Sequester.	639	Sharper.	721	Sibilant.	803	Skelder.
476	Secular.	558	Sequin.	640	Sharpling.	722	Sibyl.	804	Skelly.
477	Secund.	559	Seraglio.	641	Shaster.	723	Sibylline.	805	Skelter.

NUMERICAL CODE.—(Continued.)

806	Skeptic.	888	Snare.	970	Sour.	53000	Splenic.
807	Skewer.	889	Snarl.	971	Source.	54000	Splinter.
808	Skiff.	890	Snatch.	972	Sourness.	55000	Spurge.
809	Skilllet.	891	Snattock.	973	Souse.	56000	Splutter.
810	Skim.	892	Sneaking.	974	Soutane.	57000	Spoiler.
811	Skimmer.	893	Sneer.	975	Souter	58000	Spondee.
812	Skimp.	894	Sneeze.	976	Souvenir.	59000	Sponge.
813	Skinny.	895	Snicker.	977	Sozzle.	60000	Sponsor.
814	Skipper.	896	Snipe.	978	Spacious.	61000	Spooler.
815	Skirl.	897	Snivel.	979	Spaddle.	62000	Sporadic.
816	Skirmish.	898	Snobbish.	980	Spade.	63000	Sportful.
817	Skirt.	899	Snood.	981	Spadille.	64000	Spotless.
818	Skittles.	900	Snowy.	982	Spadix.	65000	Spousal.
819	Skiver.	901	Snub.	983	Spadroom.	66000	Spouter.
820	Skull.	902	Snuff.	984	Spale.	67000	Sprain.
821	Skull.	903	Snuggle.	985	Spalt.	68000	Sprawl.
822	Slabber.	904	Soaker.	986	Spancel	69000	Spray.
823	Slacken.	905	Snobbing.	987	Spandrel.	70000	Sprightly.
824	Slag.	906	Sober.	988	Spang.	71000	Sprinkle.
825	Slake.	907	Social.	989	Spangle.	72000	Sprinter.
826	Slam.	908	Socle.	990	Spaniel.	73000	Sprite.
827	Slander.	909	Socratic.	991	Spanker.	74000	Sprout.
828	Slang.	910	Soda.	992	Spanner.	75000	Spriuce.
829	Slant.	911	Sodden.	993	Spar.	76000	Sprunt.
830	Slapjack.	912	Sofa.	994	Sparge.	77000	Spume.
831	Slashed.	913	Soften.	995	Spark.	78000	Spunky.
832	Slater.	914	Soggy.	996	Sparkle.	79000	Spurious.
833	Slattern.	915	Sojourn.	997	Sparking.	80000	Spurling.
834	Slave.	916	Solace.	998	Sparoid.	81000	Spurn.
835	Slavic.	917	Solar.	999	Sparrow.	82000	Spurred.
836	Slayer.	918	Soldier.	1000	Spartan.	83000	Sputle.
837	Sledge.	919	Solemn.	2000	Sparth.	84000	Sputter.
838	Sleeky.	920	Solert.	3000	Sparve.	85000	Squab.
839	Sleeper.	921	Solidate.	4000	Spasm.	86000	Squabble.
840	Sleet.	922	Solitude.	5000	Spastic.	87000	Squadron.
841	Sleigh.	923	Soloist.	6000	Spate.	88000	Squail.
842	Slender.	924	Solstice.	7000	Spathal.	89000	Squally.
843	Slenth.	925	Soluble.	8000	Spathic.	90000	Squalor.
844	Slipper.	926	Solution.	9000	Spatial.	91000	Squamate.
845	Slicer.	927	Solvent.	10000	Spatter.	92000	Squamoid.
846	Slicken.	928	Somal.	11000	Spatula.	93000	Squander.
847	Sling.	929	Somatic.	12000	Spavin.	94000	Squash.
848	Slipknot.	930	Sombre.	13000	Spawl.	95000	Squatter.
849	Slipper.	931	Sombrous.	14000	Spear.	96000	Squaw.
850	Sliver.	932	Somnial.	15000	Specious.	97000	Squeak.
851	Sloam.	933	Sonance.	16000	Speckle.	98000	Squeamish.
852	Slogan.	934	Songster.	17000	Spectacle.	99000	Squeeze.
853	Sloop.	935	Sonnet.	18000	Spectator.	100000	Squelch.
854	Sloping.	936	Sontag.	19000	Spectatrix.	101000	Squib.
855	Slolithul.	937	Soothe.	20000	Spectral.	102000	Squiggle.
856	Slouch.	938	Sooty.	21000	Specular.	103000	Squilla.
857	Slough.	939	Sophic.	22000	Spelding.	104000	Squinch.
858	Sloven.	940	Sophism.	23000	Spelkin.	105000	Squint.
859	Sluggard.	941	Sopite.	24000	Spelter.	106000	Squire.
860	Sluggish.	942	Soprano.	25000	Spelunc.	107000	Squirm.
861	Sluice.	943	Sorbate.	26000	Spender.	108000	Squirrel.
862	Slumber.	944	Sorbet.	27000	Sperge.	109000	Squirt.
863	Smack.	945	Sorcery.	28000	Sperling.	110000	Stabat.
864	Smartly.	946	Sordid.	29000	Spicate.	111000	Stabber.
865	Smatter.	947	Sordint.	30000	Spicy.	112000	Stabbling.
866	Smear.	948	Sorel.	31000	Spicknel.	113000	Staccato.
867	Smectite.	949	Sorex.	32000	Spicula.	114000	Saddle.
868	Smelt.	950	Sorghum.	33000	Spider.	115000	Stadium.
869	Smerlin.	951	Sorgo.	34000	Spight.	116000	Staging.
870	Smilax.	952	Sorrage.	35000	Spignet.	117000	Stagger.
871	Smirch.	953	Sorrow.	36000	Spigot.	118000	Stagnant.
872	Smirk.	954	Sortie.	37000	Spiked.	119000	Staidly.
873	Smite.	955	Sorter.	38000	Spikelet.	120000	Stainless.
874	Smithy.	956	Sortition.	39000	Spikenard.	121000	Stairway.
875	Smitten.	957	Sorus.	40000	Spile.	122000	Stale.
876	Smock.	958	Sotadic.	41000	Spinach.	123000	Stalder.
877	Smoky.	959	Sothic.	42000	Spindle.	124000	Stalk.
878	Smoulder.	960	Sotted.	43000	Spinal.	125000	Stalled.
879	Smother.	961	Sotto.	44000	Spinet.	126000	Stallion.
880	Smudge.	962	Soubrette.	45000	Spinner.	127000	Stalwart.
881	Smuggle.	963	Souffle.	46000	Spinous.	128000	Stamen.
882	Smutch.	964	Sough.	47000	Spiral.	129000	Stamina.
883	Snack.	965	Soughing.	48000	Spirit.	130000	Stammel.
884	Snaffle.	966	Soul.	49000	Spirtle.	131000	Stammer.
885	Snaggy.	967	Sounder.	50000	Spiteful.	132000	Stampepe.
886	Snail.	968	Soundly.	51000	Spleen.	133000	Stanchion.
887	Snake.	969	Soup.	52000	Splendor.	134000	Standish.

NUMERICAL CODE.—(Continued.)

135000	Stanhope.	182000	Stipple.	229000	Stroller.	276000	Suffer.
136000	Stannell.	183000	Stipular.	230000	Stroma.	277000	Suffix.
137000	Stannite.	184000	Stirrup.	231000	Strombus.	278000	Suffrage.
138000	Stanza.	185000	Stitch.	232000	Strontia.	279000	Suffuse.
139000	Starry.	186000	Stiver.	233000	Strontic.	280000	Sugar.
140000	Starchy.	187000	Stoat.	234000	Strophe.	281000	Suicism.
141000	Stark.	188000	Stockade.	235000	Struggle.	282000	Sulky.
142000	Starling.	189000	Stocking.	236000	Struntain.	283000	Sully.
143000	Starlit.	190000	Stoic.	237000	Strychnose.	284000	Sultan.
144000	Startle.	191000	Stoicism.	238000	Stubble.	285000	Sultanic.
145000	Starve.	192000	Stoker.	239000	Stubborn.	286000	Sumac.
146000	Statal.	193000	Stolid.	240000	Stucco.	287000	Sumbul.
147000	Statant.	194000	Stolon.	241000	Studding.	288000	Summit.
148000	Stately.	195000	Stomatic.	242000	Student.	289000	Summon.
149000	Static.	196000	Storax.	243000	Studio.	290000	Sumpter.
150000	Statuary.	197000	Stork.	244000	Stumble.	291000	Sunder.
151000	Statue.	198000	Straddle.	245000	Stumpage.	292000	Sunken.
152000	Stature.	199000	Straggle.	246000	Stunner.	293000	Sunny.
153000	Staunch.	200000	Strainer.	247000	Stupefy.	294000	Sunshine.
154000	Stave.	201000	Strand.	248000	Stupid.	295000	Superb.
155000	Steak.	202000	Stranger.	249000	Stupor.	296000	Supine.
156000	Steal.	203000	Strangle.	250000	Sturdy.	297000	Suppage.
157000	Stealthy.	204000	Strapper.	251000	Sturgeon.	298000	Supper.
158000	Steeple.	205000	Strapple.	252000	Stutter.	299000	Supplant.
159000	Steering.	206000	Strass.	253000	Stygian.	300000	Supple.
160000	Stellar.	207000	Stratagem.	254000	Stylish.	301000	Suppliant.
161000	Stellate.	208000	Strategy.	255000	Stylike.	302000	Supreme.
162000	Stellify.	209000	Stratify.	256000	Stylus.	303000	Surbate.
163000	Stemple.	210000	Stratum.	257000	Styptic.	304000	Surcease.
164000	Stencil.	211000	Straught.	258000	Styrax.	305000	Surcoat.
165000	Stentor.	212000	Streaky.	259000	Suasive.	306000	Surdal.
166000	Steppe.	213000	Streamlet.	260000	Subdue.	307000	Surfeit.
167000	Sterile.	214000	Strengest.	261000	Sublate.	308000	Surfy.
168000	Sterlet.	215000	Strepent.	262000	Sublime.	309000	Surgent.
169000	Sternite.	216000	Stretcher.	263000	Suborn.	310000	Surgical.
170000	Steward.	217000	Striate.	264000	Subsist.	315000	Surmise.
171000	Sticker.	218000	Strickle.	265000	Subsoil.	320000	Surmount.
172000	Stickle.	219000	Stricture.	266000	Subtile.	325000	Surname.
173000	Stifle.	220000	Stride.	267000	Suburb.	350000	Surplice.
174000	Sigma.	221000	Strident.	268000	Subvene.	375000	Surrey.
175000	Stiletto.	222000	Strigate.	269000	Subvert.	400000	Surtout.
176000	Stillage.	223000	Striker.	270000	Succinct.	500000	Survey.
177000	Stilted.	224000	Stringy.	271000	Succor.	600000	Survive.
178000	Stimulus.	225000	Stripling.	272000	Succumb.	700000	Suspire.
179000	Stinger.	226000	Stroam.	273000	Sucker.	800000	Sutler.
180000	Stingy.	227000	Stroble.	274000	Sudary.	900000	Suture.
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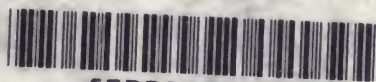
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